

The Canadian Medical Association Journal

Vol. 50

TORONTO, MAY, 1944

No. 5

PROCEDURES RECOMMENDED FOR THE ORGANIZATION AND OPERATION OF A BLOOD BANK*

Part I.

By **L. J. Rhea, M.D.**, *Pathologist,
Montreal General Hospital*

O. F. Denstedt, Ph.D., *Department of
Biochemistry, McGill University, Montreal*

A. Bertrand, M.D., *Bacteriologist,
Notre Dame Hospital, Montreal*

C. J. E. van Dorsser, B.S.A., *Director,
Blood Bank, Royal Victoria Hospital, Montreal*

P. H. Greey, M.D., *Bacteriologist,
Banting Institute, University of Toronto*

IN the storage of whole blood for transfusion purposes, the main object is the preservation of the red cell. This not only implies the prevention of hæmolysis, that is, the keeping of the cell membrane intact, but also the inhibition of changes within the cell which might impair its function when again placed in circulation. The cell membrane is extremely delicate and its stability, particularly outside the body, is influenced by chemical agents and by physical conditions. The cell contents, on the other hand, undergo autolytic (enzymic) changes resulting in the breakdown of complex organic compounds into simpler molecules. This process leads to an increase in the osmotic pressure within the cell, particularly if the newly-formed products are non-diffusible, with the consequence that water enters, causing the cell to swell and ultimately to burst. Hæmolysis during storage is due largely to osmotic causes, rather than to the presence of hæmolytic agents. It is possible, however, that the cell membrane also may be affected by autolytic processes and by the presence of added substances, in which event the rate of hæmolysis is accelerated.

All methods of preservation so far developed

consist simply in collecting the blood in a suitable anti-coagulant and storing the mixture in the cold, usually at about 4° C. Simple as this may appear to be in principle, successful preservation depends on the careful observance of numerous conditions, some of which are briefly reviewed in the following paragraphs.

STERILITY

In collecting blood for storage, every precaution must be taken against contamination. It is now generally agreed that contamination is almost always due to faulty technique either in the cleaning and sterilizing of the equipment, or in the collecting and handling of the blood. Contact of the needle with bacteria on the skin at the site of venipuncture has been suspected as a cause of infection. This, however, is not likely to be a common cause, provided that the skin is adequately cleansed beforehand. Blood-borne infection in healthy donors also is highly improbable. The ordinary open technique should not be used for collecting blood for storage, but it may be modified so as to be relatively safe.

In the operation of a blood-bank it often is difficult to perform complete sterility tests on every specimen of blood and plasma. There are simplified tests, however, which are rapid, convenient, and satisfactory for the detection of gross contamination. Stored specimens which show early and progressive hæmolysis either are contaminated or are unstable, and should be discarded.

Trouble from contamination may be most effectively reduced by careful selection and training of personnel.

TEMPERATURE

Since cold is the chief preservative agent in the storage of blood, the first requirement is proper temperature control. This may be obtained by having adequate refrigeration capacity, automatic temperature regulation and by frequent defrosting of the cooling unit. The refrigerator should be reserved for blood storage only. The temperature should be main-

* This report was prepared at the request of the Subcommittee on Shock and Blood Substitutes of the National Research Council of Canada.

tained at 4 to 6° C., and should be checked periodically with a recording thermometer or an ordinary thermometer inserted in a stoppered test tube containing water. Disregard of temperature control will give rise to erratic results in preservation.

PRESERVATIVE MIXTURES

The so-called "preservative" mixtures used in the storage of blood consist of an anti-coagulant, usually sodium citrate, with or without the addition of dextrose or other substances. Citrate solution by itself, though still in common use, is one of the poorest preservatives. The consensus is that blood kept in citrate should not be used after a week, although in many instances older specimens have been used without ill effects. After a week the red cells usually become unstable and hæmolysis proceeds at a rapid rate. The addition of dextrose to the citrate, on the other hand, greatly improves the preservation of the red cells. Blood stored in a suitable amount of isotonic citrate-dextrose mixture may be kept for six weeks, and in some cases two months, with a negligible degree of hæmolysis. It is important that the solutions be isotonic with plasma. Hypertonic mixtures, as might be expected, prevent hæmolysis during storage, but once the cells become equilibrated with the solution, they are liable to break down when mixed with normal plasma. The addition of sodium chloride to the citrate-dextrose mixture usually gives less efficient preservation of the red cells. Likewise the addition of potassium chloride and magnesium sulphate is of questionable merit according to most authorities.

Among the more recently developed preservative mixtures is citrate-dextrose buffered with phosphate. When blood is stored in this mixture, the red cells pack less densely on sedimentation and at least some of the autolytic changes, notably the breakdown of organic phosphates, are retarded. Blood may be stored in this mixture even at 10° C. for a month or six weeks without appreciable hæmolysis. As pointed out later, however, some of the cells undergo deterioration after about the twentieth day even though the cell membrane may remain intact.

Citrate inhibits clotting by forming a complex with calcium, converting it into the non-ionized state. Heparin, on the other hand, inhibits the process by inactivating prothrombin

or thrombin. Heparin, alone, or mixed with citrate, is less effective than citrate by itself in retarding fibrin formation in blood or plasma during storage. For best results about 12 c.c. of isotonic sodium citrate (3.0%) per 100 c.c. of blood, that is, a final concentration of about 0.4%, is recommended. The minimum final concentration necessary to prevent coagulation is about 0.2%. Oxalate removes calcium ions by forming an insoluble salt, but being poisonous, cannot be used clinically as an anti-coagulant.

Storage of blood under carbon dioxide does not give consistently better preservation, and hence does not appear to be of practical importance.

PROPORTION OF BLOOD TO DILUENT

In addition to the composition of the diluent, the proportion of blood to diluent is an important factor in the preservation of red blood cells. With any preservative mixture individual bloods may differ considerably in cell stability during storage. In the case of citrate-dextrose, the majority of bloods show optimal stability when mixed with from one-third to one-half of a volume of diluent. With buffered mixtures, on the other hand, the proportion of diluent may be increased up to one and one-half times the volume of blood without impairing cell stability.

The effect of increasing the proportion of diluent is to reduce autolytic changes in the plasma and also within the red cell. The most apparent change in the plasma during storage is the slow precipitation of fibrin. In low dilutions, *e.g.*, 10:1 (10 parts of blood to one of diluent), a ratio still fairly widely used, fibrin precipitation may become extensive within 10 to 15 days. Precipitation rarely occurs in the plasma zone but is confined to the plasma between the sedimented red cells. The fibrin usually takes the form of soft jelly-like masses, with strands extending amongst the cells. Frequently the precipitate gives trouble by plugging the outlet tube during transfusion of the sample. By increasing the proportion of diluent, many of these difficulties may be overcome. Not only are autolysis and fibrin formation reduced, but the fibrin tends to precipitate out in less compact form, and when the cells are resuspended it is broken into minute fragments. When blood is collected in one-third or one-half its volume, for example,

difficulty is seldom experienced due to fibrin precipitation. The use of still greater dilutions would further minimize these changes. However, since in transfusing blood it is desirable to give as much hæmoglobin (red cells) as possible, the use of excessive amounts of diluent is undesirable. A ratio of blood to diluent of 1:1/2 usually is acceptable, and gives very satisfactory results with most bloods. A 1:1/3 dilution gives practically as good preservation as 1:1/2, but the precipitation of fibrin is slightly more pronounced. There is little difficulty with the 1:1/3 mixture if the blood is stored at 6 to 8° C., and is used within two weeks.

COLLECTION OF BLOOD

In the operation of the blood-bank the collection of blood may be facilitated by the use of evacuated flasks. It should be realized, however, that the use of strong suction tends to produce frothing of the blood and may cause considerable damage to the red cells, particularly if the flask is agitated too vigorously during the procedure. It is much better to invert the flask, thus permitting the blood to pass directly into the preservative and to be mixed without frothing or splashing. The flask should not be agitated. The cells are more fragile immediately after collection, but regain much of their normal stability in the course of 12 to 24 hours. The slight degree of damage that persists is of little concern if the blood is to be used within two weeks. If optimal preservation is desired, the blood should be collected by spontaneous flow, or with the aid of only slight suction. Under these conditions the flask should be swirled slowly and continuously during the procedure to arrest the clotting reaction.

CHANGES IN BLOOD DURING STORAGE

1. *Lipid precipitation.*—In the majority of stored specimens a white precipitate collects at the surface in the course of two or three weeks. The precipitate consists chiefly of neutral fat, cholesterol and other plasma lipids, and is always present in greater amounts in blood samples collected soon after a meal. Blood collected after a heavy fatty meal usually contains an excessive amount of lipid, chiefly fat dispersed as fine globules, and has an abnormal milky appearance. Many authorities recommend the discarding of such specimens because

of the content of other products of digestion which sometimes cause urticarial reactions in allergic patients. There is no evidence that the lipid in itself is objectionable. On slight agitation the material disperses immediately in colloidal form. In the earlier days of blood preservation the surface precipitate often was mistaken for bacterial contamination, and many good lots of blood were discarded. The lipids, themselves, are normal constituents of blood and do not detract from the efficacy of preserved samples.

2. *Packing of cells.*—Blood from different individuals exhibits considerable variation with respect to the tendency of the red cells to pack and stick together on sedimentation. Cohesion of the cells is favoured by storing blood in excessive dilutions of citrate-dextrose. The difficulty is negligible with the 1:1/3 or 1:1/2 dilution even up to 30 days' storage, and tends to be less pronounced with the buffered preservative. Densely packed cells not only are difficult to resuspend, but tend to be less stable, particularly if the dispensed sample is warmed, or is permitted to stand for a few hours at room temperature.

3. *Hæmolysis.*—Since blood contains red cells ranging in age from those recently liberated into the circulation, to those about to be discarded because of old age (80 to 125 days), it is logical to expect that the latter group should be the first to break down during storage. Even these, however, may remain intact for several weeks. Obviously, their breakdown casts no reflection on the quality of the remaining cells, a large proportion of which may still be capable of normal function. In the majority of bloods, hæmolysis is usually less than 1% up to the thirtieth day of storage.

In samples stored in citrate alone, hæmolysis and the diffusion of free hæmoglobin into the supernatant plasma layer, usually become visible about the tenth day. In citrate-dextrose, the change is noticeable at about the sixth week, when between 2 and 3% of the red cells have broken down. Since the free hæmoglobin must diffuse through the white-cell layer, overlying the red cells, it is obvious that the time when hæmolysis is detectable depends somewhat on the thickness and the density of the white-cell layer. If samples are moved about during storage, this layer may be disturbed, or may be folded back on itself, thus permitting freer diffusion of hæmoglobin from

the red-cell zone when hæmolysis begins. In view of these circumstances, it is evident that the appearance of free hæmoglobin in the plasma zone is not a reliable criterion of the condition of stored specimens.

At the end of six weeks the total amount of free hæmoglobin in a 600 c.c. sample, originally containing 10 gm. % of cellular hæmoglobin, may amount to about 2 gm. On transfusion, this amount of free hæmoglobin is removed rapidly, and without difficulty, by the liver and other parts of the reticulo-endothelial system. Subsequent breakdown of cells usually occurs gradually and without danger of exceeding the renal threshold for hæmoglobin which, in man, ranges in concentration from about 0.12 to 0.7 gm. per 100 c.c. of blood. The amount of free hæmoglobin in properly stored samples, even after six weeks, therefore, is too small to be of consequence if placed in the circulation. It has been shown that man is capable of excreting rather large amounts of pure hæmoglobin, apparently without kidney damage, provided that the urine is kept alkaline. In severe hæmolytic reactions, after transfusion of incompatible blood, however, anuria may occur as a result of the sudden liberation of large amounts of hæmoglobin, cell membranes, stroma-globulin and possibly other substances. While the body can dispose of small amounts of free hæmoglobin without difficulty, it is generally agreed that the use of slightly hæmolyzed samples should be discouraged.

4. *Changes in distribution of electrolytes.*—When blood is removed from the circulation a change occurs in the permeability of the red-cell membrane to various ions and other diffusible substances. Thus, during storage, potassium ions, which normally are held within the corpuscle, slowly escape into the plasma and sodium ions enter the corpuscle. The exchange is more rapid at 4° C. than at higher temperatures. Phosphate, on the contrary, appears to diffuse less readily through the membrane when blood is stored in the cold. Other electrolytes also undergo exchange, but less attention has been paid to them. The derangement in the electrolyte composition during storage, at least up to 18 days, apparently has no serious effect on the functional properties of the cell. Maizels^{1, 26} has shown that when preserved cells are placed in the circulation again they apparently are reconditioned, and

that their normal electrolytic composition is restored within 24 hours.

5. *Autolytic changes.*—Numerous enzymic reactions occur, particularly inside the red cells, during storage, the most spectacular being the breakdown of dextrose into lactic acid and other intermediates (glycolysis) and the hydrolysis of organic phosphates with the liberation of inorganic phosphate. Both these processes are retarded when dextrose is added to the preservative solution. The decomposition of organic phosphates and the increase in cell volume during storage are retarded by the presence of phosphate buffer. Although these osmotic changes may influence the rate of cell swelling there appears to be no clear-cut quantitative relationship between the breakdown of phosphates, and the rate of hæmolysis during storage. Doubtless the autolytic changes have an effect also on the functional properties of the cell, but there is evidence that, within limits, chemical changes are reversible, particularly when the cells are again placed in the circulation. Beyond these limits, however, some of the changes become irreversible, hence cell function cannot be restored.

6. *Changes in other elements of the blood.*—The platelets and white cells, with the exception of some of the lymphocytes and monocytes, disappear rapidly during the first week or two of storage. Even if not destroyed they sediment out and cohere firmly to form a film, from which state they cannot be individually dispersed again.

Prothrombin also disappears fairly rapidly, being reduced to about one-third of the normal titre at the end of thirty days. Complement disappears still more rapidly.

The diminution in the above elements during storage is of relatively little importance if the blood is used in the treatment of acute hæmorrhage.

7. *Changes in the "fragility" of red cells during storage.*—The stability or instability of preserved red cells to hypo- or iso-tonic saline solutions, or to compatible plasma, may be of use in predicting which specimens will undergo hæmolysis first during storage, but the test gives no reliable information as to how the cells will survive and function after transfusion. Since there is no relation between the results of the fragility test and cell viability, the method has no practical worth for evaluation

of the condition of stored samples. As yet, unfortunately, there is no satisfactory *in vitro* test for cell viability.

RE-SUSPENSION OF CELLS IN PRESERVED SAMPLES

The red cells should be dispersed by slowly rotating the flask. The latter may be inverted occasionally, but should not be shaken. Gentle agitation should be continued for 5 to 10 minutes until no dark sedimented cell patches are visible through the bottom of the flask. Incompletely dispersed cells may be retained by the strainer, thus giving rise to difficulties in administering the sample, and resulting in a considerable loss of material.

FEBRILE REACTIONS

That some workers have had better success than others in the clinical use of preserved blood is not surprising, considering the diversity of methods of preservation, care of equipment and technique of administration. It is noteworthy that in institutions where intravenous therapy is in charge of a highly trained group the incidence of reactions is relatively low. With gradual elimination of the poorer preservative solutions and the current trend toward standardization of procedures and equipment, many of the former difficulties have been eliminated. It is now common experience that the incidence of reactions with stored blood is no greater than with fresh blood, namely from 4 to 6%. Several authorities have experienced fewer reactions with stored blood. Since reactions from the intravenous injection of saline, dextrose and other fluids amount to about 3%, the net incidence from blood transfusions would be from 1 to 3%. No toxicity develops during storage of blood even up to two months. There is no longer any doubt regarding the safe use of blood preserved by improved methods.

It is generally agreed that the majority of transfusion reactions arise from the use of impure materials and improperly cleaned equipment. Most of the difficulties encountered, therefore, are avoidable. It is most important to use freshly distilled (pyrogen-free) water and the purest materials in the preparation of solutions. It should be remembered also that the presence of "Reagent", "C.P." or other designations of purity on the label of a bottle does not always guarantee freedom from pyrogenic contamination. As a rule, however,

chemicals of the best quality are free from these impurities.

At one time, the elevated plasma potassium of stored blood was believed, by some authorities, to be a likely cause of reactions. This is now regarded as highly improbable.

As there are no reactions peculiar to the use of stored blood, this topic will not be discussed further in this memorandum. For a wider discussion of the subject the reader is referred to the numerous recent reviews.^{2, 3, 4, 5}

EFFICACY OF PRESERVED BLOOD

Although the main object in storing blood is preservation of the erythrocytes, modified methods have been sought for conserving other constituents as well. So far little success has been achieved in preserving leucocytes, platelets, and factors such as complement, prothrombin, the hæmostatic, and immunologic properties of whole blood. Stumia, however, has succeeded in maintaining prothrombin and complement in plasma by storing it in the frozen state. Diminution, or complete disappearance, of these properties in whole blood does not seriously limit its usefulness. When any of the more labile properties are needed, for example, in treatment of disease of the hæmopoietic system or anæmia with infection, fresh blood usually is available in the blood bank, or can be obtained, and should be used. On the other hand, in treating acute hæmorrhage, traumatic shock, and chronic secondary anæmia, blood stored up to thirty days has been used with good results. The immunologic properties such as antibodies are better preserved in serum at 4° C. than in whole blood or in plasma.

Some of the erythrocytes liberated into the circulation from the bone marrow, perish sooner than others because of imperfections, or possibly from being subjected to greater wear and tear. Using the agglutination method of Ashby⁶ and Wiener,⁷ it was found that fresh red cells injected into the human circulation disappear within 125 days. Only a few cells survive to this limit, however, the majority lasting about 80 days. The latter value is now widely accepted as the life span of the average red cell. Other methods give values ranging from 30 to 80 days. The average length of life of the erythrocyte doubtless varies with the individual and may fluctuate in the same person with variations in activity, health, diet

and other conditions. The red cells in properly stored blood are functionally equivalent to fresh blood up to about the 20th day. Beyond this period an increasing number of cells undergo deterioration, and the rate of disappearance from circulation after transfusion becomes more rapid. This does not mean that blood cannot be used after twenty days' storage. The main requisite under such circumstances is that a sufficient proportion of the transfused cells remain functional during the critical period of need, *i.e.*, for a week or so. Whether they last 50 days or 125 days is of little consequence, since the patient's own red cell production becomes rapid in the course of a few days.

While blood can be stored up to two months with a negligible degree of hæmolysis and without becoming toxic, about 20 days appears to be the storage limit up to which preserved cells should be considered functionally equivalent to fresh cells. Even 30-day-old blood, however, is better than nothing in the emergency treatment of acute hæmorrhage.

Rapid destruction of compatible red cells after transfusion may be due either to instability of the donor blood or to an abnormal tendency on the part of the recipient to destroy injected cells. The capacity of erythrocytes to survive in the circulation is the only criterion yet available for determining the efficacy of stored blood. In view of the variables involved it is apparent that much more information is needed on the subject before the limits of usefulness of preserved blood can be defined.

THE EFFECT OF STORAGE ON THE VIABILITY OF THE SPIROCHÆTE PALLIDA AND PLASMODIUM OF MALARIA

Several workers^{8, 9, 10} have shown that the spirochæte dies within 72 hours in blood stored at 4° C. Slow freezing and slow thawing of blood also destroy the organisms. If quick-frozen and stored at very low temperatures, however, they remain viable for a long time. They are destroyed by desiccation, hence do not survive in dried plasma, or serum. On purely theoretical considerations it would appear that stored blood generally should be safer than fresh blood, particularly since recent infection with this organism is not always detectable by the usual tests.

When it is necessary to administer blood before a standard test for syphilis can be done, any of the exclusion tests can be used. Such a test can be performed within a few minutes, and if properly done, is decisive.

The plasmodium of malaria usually perishes within a few days in blood stored at 4° C. and certainly is destroyed within a week.¹¹ This parasite also is destroyed by desiccation. Preserved blood, therefore, is safer than fresh blood with regard to the transmission of malaria by transfusion.

It should be borne in mind that ordinary micro-organisms may remain well preserved in both liquid and desiccated plasma and serum.

THE BLOOD GROUPS

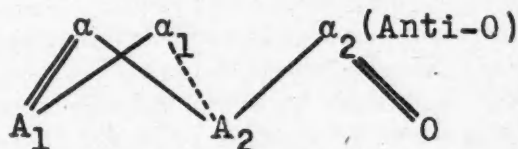
For a detailed discussion of this topic the reader is referred to the numerous recent reviews,^{2-5, 12} and to the British bulletin on

Principal blood groups	Agglutinogens (in red cells)	Agglutinins (in plasma)
O	None (<i>i.e.</i> , A and B absent)	α and β ; (α_1 rare; reacts with A_1 cells).
A	Subgroup A_1	β , (α_2 very rare; reacts with 95% of A_2 cells, and with all Group O cells).
	Subgroup A_2	β , (α_1 rare; reacts with A_1 and A_1B cells).
B	B	α , (α_1 rare; reacts with A_1 cells). (α_2 very rare; reacts with most A_2 and all O cells).
AB	Subgroup A_1B	None (or very rarely, α_2).
	Subgroup A_2B	None (or rarely, α_1).
	M	No agglutinins normally present.
	N	" " " "
	M and N	" " " "
	Rh factors	" " " "
	P	" " " "

"The Determination of Blood Groups".¹³ Only a brief discussion will be undertaken here.

The International classification of the blood groups is the only one of use in a discussion of the subject. Even this classification hardly accommodates the newer knowledge in this field. The expanded classification given on the previous page will suffice to illustrate the blood factors known at the present time. In the clinical use of blood the four principal blood groups usually are the only ones that matter.

The following scheme, from Wiener,² indicates the relative affinities of the A and "O" agglutinogens for the corresponding antibodies, i.e., agglutinins. The double line indicates very strong affinity, the single line, strong, and the dotted line, relatively weak affinity.



Of the subgroups of A about 75% belong to A₁ and about 20% to A₂. There is evidence of the existence of a subgroup A₃, but this factor is rare. A rare subgroup of B also has been reported. Obviously, since group O cells are strongly agglutinated by the α₂ agglutinin there is no such person as a "universal donor". Fatalities which sometimes have occurred after the administration of group O blood to subjects of group A₁, B or A₁B, have been traced to the presence of the α₂ agglutinin in high titre, in the recipient. The occurrence of this agglutinin is comparatively rare, and when it is present its titre often is weak.

No agglutinins exist normally in the plasma against the more recently discovered factors, M, N, Rh, and P. These agglutinogens, therefore, cannot give rise to transfusion incompatibilities unless the recipient has built up a sufficiently high titre of antibodies from previous and repeated transfusions of blood of a type different from his own. Approximately 45% of the white population in America belongs to type MN, while, among the remainder, the type M occurs more frequently than type N. In other words, all individuals must have either or both of these factors on the red cells.

The Rh factor, a Mendelian dominant property, which occurs also in the rhesus monkey, is present in the red cells of about 85% of white people. The remaining 15% of the white

population is "Rh-negative"; that is to say, the red cells of these people do not contain the Rh agglutinin. Little is known about the P factor except that it is present on the cells of some individuals and absent from others. The factors A, B and Rh are much more potent antigens in the human than are M, N, and P. Thus, for example, if a subject belonging to group ORh- receive repeated transfusions of ORh+ blood, he will build up antibodies against the factor Rh. Later, when the titre of anti-Rh in the plasma becomes sufficiently high, Rh+ blood will no longer be compatible, and if a further transfusion of this type be given, the recipient may suffer a severe, or even fatal, hæmolytic reaction. In Rh-negative subjects who have been given repeated transfusions of Rh-positive cells, a severe chill may give warning of an increasing titre of the anti-Rh agglutinin. Obviously, careful cross-matching should be done before every transfusion, even if repeated transfusions have been given from the same donor on previous occasions without cross-matching.

Rh-negative women are in a more uncertain position than are men of this blood type, because of the possibility of isoimmunization during pregnancy. Thus, for example, if an Rh-negative woman has an Rh-positive husband, and the fetus, by heredity, happens to be Rh+, the mother, in the course of pregnancy, sometimes, though not always, becomes immunized by the red cells of the child, and may build up a high titre of the Rh antibody. It is claimed that under some conditions at least, possibly through a defect of the placenta, the antibody of the mother may react with the cells of the child, causing abortion, or may give rise later to the often fatal anæmia of the new-born, erythroblastosis foetalis. Isoimmunization in this manner is held to be a likely cause of abortions especially in Rh-negative women. Fortunately, isoimmunization by this means does not always occur, and even when it does occur, many individuals do not generate high levels of anti-Rh. Numerous instances are now known where Rh-negative women have given birth to Rh-positive children, and in some cases repeatedly, without any difficulty. In cases where post-partum transfusions may be required by Rh-negative women, special attention must be paid to cross-matching, since if anti-Rh happens to be present in high titre, a transfusion of Rh-positive blood will prob-

ably prove fatal. This may explain some hitherto obscure post-partum transfusion fatalities.

Attention has been given recently to the possibility of Rh-immunization in wounded soldiers of the Rh-negative type, who may require repeated transfusions. The consensus is that there is little likelihood of serious difficulty from this cause in the majority of Rh-negative male individuals. In men of this type a chill or other mild reaction will usually give warning of an increasing titre of anti-Rh.

Reactions are not likely to occur from repeated transfusion of type-M blood into type-N subjects, or vice versa, since the titre of anti-M or anti-N, in humans, has never been known to reach a sufficiently high level.

PLASMA AND SERUM

In the operation of a blood-bank, it is necessary to maintain a supply of plasma as well as whole blood. When plasma is prepared the red cells may be utilized as described later.

General appearance of plasma.—Plasma may be clear or may be more or less opalescent or turbid depending on the content of lipid. Frequently, plasma is decidedly yellow in colour due largely to the presence of bilirubin. This may occur in healthy donors and is of no concern. During storage the plasma may develop a greenish coloration, which also is inconsequential. The presence of free hæmoglobin imparts to plasma a faintly pink to red coloration depending on the degree of hæmolysis. The amount of free hæmoglobin in pink to slightly orange coloured samples is very small and can be disregarded. Extensively hæmolyzed samples, however, should be discarded. When kept at room temperature free hæmoglobin is slowly converted into the brown pigment, methæmoglobin.

Plasma, containing lipid, tends to become clarified in the cold as the lipid material rises to the surface. The precipitate is readily dispersible and should not be mistaken for bacterial growth. The presence of lipid does not detract from the usefulness of the sample. When plasma is stored above 10° C. the lipid tends to remain in the normal state of colloidal dispersion.

Fibrin tends to form in plasma stored in the cold but not at room temperature or above 15° C. The material may assume the form of

a sheet or "veil". Apart from difficulty it may cause by obstructing the outlet tube during administration, the presence of fibrin is of no consequence. Because of the tendency of fibrin to form, plasma should always be strained prior to, or during administration.

A sterility test should be done on each pool of plasma or serum. Serum may be filtered through Seitz or other bacteriologic filters, but it is impracticable to treat plasma in this manner since fibrinogen is removed and rapidly clogs the filter.

Numerous highly satisfactory procedures for the separation of plasma have been devised by manufacturers of blood-bank equipment. Some of the systems include centrifuge bottles for accelerating the sedimentation of the red cells, thus increasing the yield of plasma. In removing the plasma it is desirable to avoid drawing off the white-cell layer.

The prothrombin titre falls in plasma during storage in the liquid state. Strumia¹⁴ has observed that prothrombin and complement may be retained by storing the plasma in the frozen state. When required for use, the material should be thawed rapidly at 37° C. with constant agitation.

During exposure, and especially during desiccation, carbon dioxide escapes from plasma and serum, thus causing bicarbonate to be converted to carbonate. With the loss of carbon dioxide the pH of liquid plasma will rise to pH 8.5-9.0. Dried serum or plasma, on reconstitution, has about this reaction, but the alkalinity is of little concern metabolically since the carbonate is rapidly neutralized by CO₂ to bicarbonate in the blood stream. The alkaline reaction accelerates the destruction of prothrombin. Strumia therefore has recommended the use of 0.1% citric acid solution in place of distilled water for reconstituting dried plasma or serum.

Plasma, if fairly fresh, may be converted to serum by addition of calcium chloride. After removing the fibrin precipitate the serum has been used with satisfactory results.^{15, 16}

(To be continued. References will appear in Part II.)

INVEST IN VICTORY TODAY . . .

ENJOY SECURITY TOMORROW

**THE EFFECT OF DIFFERENT AGENTS
ON THE RATE OF EPITHELIAL
REGENERATION: USE OF THE
DERMATOME DONOR AREA IN
OBTAINING CLINICAL DATA***

By Hamilton Baxter, M.D.,
Captain J. A. F. Stevenson, R.C.A.M.C.,
Victor Schenker, B.Sc. and
J. S. L. Browne, M.D.

Montreal

THE advent of the present world war has stimulated research in problems of wound healing and epithelial regeneration. The high incidence of casualties with burns and gaping lacerated wounds indicates the importance of attempts to reduce the length of the period of hospitalization. In some theatres of war burns account for 15 to 20% of casualties. It has been estimated that 80% of the wounds of this war are caused by low velocity missiles, such as result from shell fire and bombing. Early skin grafting is, of course, imperative if the whole thickness of skin has been lost. As soon as the granulating bed is in suitable condition to ensure a successful "take" of a skin graft, the procedure should be carried out.

However, any therapy which would aid the proliferation of large areas of partially destroyed skin as in burns, or smaller areas of full thickness skin loss, would be of great practical value.

As Brown and McDowell¹ have noted there are marked differences in the rate of epithelial regeneration in different patients, even when the individuals are taking substantially the same adequate hospital diet. This may be dramatically observed in patients who have suffered severe burns with full thickness loss of skin. An occasional patient will heal wide areas of full thickness loss and obtain a satisfactory permanent scar-covering adequate for function.

Finally, some few do not seem to possess the necessary stimulus to continued growth of epithelium from the borders of the defect. They continue to lose body fluids, suffer the drain of chronic infection, and may eventually die if not skin-grafted successfully. This same effect has been observed in the healing of donor areas in patients who are in the same age-group, and

who have had skin grafts of identical thickness removed from similar donor areas.

Wound-healing experiments on animals may sometimes give misleading results, due to difficulty in control, greater chance of infection, a very mobile skin, in most animals densely covered with hair, and these results should be checked against human experiments when possible. With the introduction of the Padgett dermatome, in 1939, it has been possible to create identical wounds of controllable depth, so that all degrees of damage to the skin may be studied. Since this problem was undertaken, Cannon and Cope² have recently published a paper showing the effect of common methods of treatment used in burns, on donor areas, with dramatic results. A great variety of drugs and other agents have been advocated to accelerate wound healing and epithelial regeneration. Recently, the local application of plasma and red blood cells and hormones has been suggested.

METHOD

The effect of different agents on the rate of epithelial regeneration was studied on patients who required skin grafts for reconstruction of various deformities, the majority of which were due to burns not of recent occurrence. These patients were in good physical condition, and with the exception of the deformity were normal. In a few cases the skin grafts were used to cover granulating areas due to recent burns. In all cases the convalescence was rapid and uneventful. The diets were standard hospital diets, considered adequate, and were well taken by all patients. A total of fifty-four donor areas on 31 patients were studied during the course of this investigation.

The majority of the donor areas were situated on the antero-medial aspect of the thighs, and were cut in a longitudinal direction. The donor areas were situated only on areas upon which the patient would not lie when in bed. For this reason the lateral and posterior aspects of the thighs, as well as the back, were excluded, because it was observed that donor areas on which the patients lie do not heal as quickly and are more liable to infection. In most instances both thighs were used, one being dressed with the standard (Bettman's gauze) and the other with the experimental material, since in a controlled series of cases it was found that with identical technique and dressings, healing was simultaneous on both sides. As a further pre-

* From the Department of Plastic Surgery and the University Clinic, Royal Victoria Hospital, Montreal.

caution, sometimes only one thigh was used and the donor area was divided into two large longitudinal portions, one of which was covered with a standard dressing and the other with an experimental preparation. The abdomen was used in three patients. Since it is a well established observation that the thickness of the skin varies considerably in different parts of the body it was considered advisable to use the antero-medial surface of the thigh routinely.

The donor area was shaved, washed with green soap and alcohol, followed by zephiran. In twenty-four cases a dermatome set at 0.014 inch was used to remove the grafts which were of uniform thickness. In seven patients, the grafts varied from 0.012 inch to 0.020 inch. In only one instance was so much of the dermis removed that healing was delayed. In view of the fact that irregularities in width may be produced by sharpening the dermatome blade, and as a check on the accuracy of the depth regulating mechanism, it is suggested that a "shim" of the desired thickness be passed between the blade and the drum before the graft is removed, to ensure that the same thickness of skin will be removed in each case.

The standard preparation chosen to apply to the donor area was fine mesh gauze (No. 44) impregnated with Bettman's ointment.* This preparation has been used for many years in numerous plastic surgery clinics. The various experimental preparations to be tested were placed beneath the gauze on one side, and then both the control and experimental areas were dressed with a pressure dressing. The pressure dressing which has been advocated by Blair and Brown⁴ for many years on both skin graft donor and recipient areas is of great aid in promoting rapid healing. All patients were kept in bed until healing was complete, since accidental

* Bettman's ointment: Oxyquinoline sulphate, gr. x; Trichlorbutanol, gr. xl; Liquid paraffin, dr. iv; Scarlet red ointment 5%, oz. iv.

trauma, slipping of the bandage, or friction on the area from walking, might adversely influence the rate of healing.

The rapidity of healing, which varied between six and nine days in most instances and did not take longer than fifteen days in the most prolonged case, indicates that sufficient epithelial elements remained to permit the healing process to be one primarily of epithelial regeneration.

Table I shows the similarity in rate of healing when grafts were removed from both thighs. These were cut from similar areas on each thigh at the same operation, were of uniform thickness and approximately equal in size. The donor areas were dressed with Bettman's gauze and pressure dressings. In all cases the rate

TABLE I.
RATE OF HEALING OF DONOR AREAS ON THIGHS*

Name	Age	Right thigh	Left thigh	Remarks
W.P.	9	7 days	7 days	All the grafts were removed from the antero-medial surface of the thighs. The grafts averaged 3 inches by 6 inches and were in adults.
G.D.	24	9 days	9 days	
T.M.	53	7 days	7 days	
G.McP.	23	8 days	8 days	
C.R.	58	9 days	9 days	
W.O.	45	9 days	9 days	

*The grafts were removed at the same time, were of uniform thickness, 0.014 of an inch, and were dressed with Bettman's gauze and a pressure dressing.

of healing was identical. The establishment of this fact was important as a preliminary to the use of control and experimental areas on the same patient. In general, dressings on the donor areas were changed for the first time three days after operation, and then every second day until the final stages of healing approached when the dressings were usually changed daily. Sterile dressing technique was employed. Following the removal of a skin graft there is rather free capillary oozing from the donor area, and it was found by experience that frequent removal of the blood-stained dressings accelerated the healing process by replacing the

TABLE II.
EFFECT OF VARYING THICKNESS OF GRAFT AND AREAS OF BODY ON RATE OF HEALING OF DONOR AREAS

Name	Age	Thickness of graft	Area	Days	Remarks
M.C.	18	0.014	Thigh (lateral)	8	In all cases the donor areas were dressed with Bettman's gauze and a pressure dressing.
M.C.	18	0.016	Abdomen (right)	8	
S.P.	11	0.012	Thigh (antero-medial)....	8	
G.St.A.	20	0.020	Thigh (antero-medial)....	8	
B.L.	59	0.014	Thigh (antero-medial)....	18+	Skin was very thin and atrophic, and only a wide network of dermis remained with fatty tissue projecting through. Healing very slow.

soggy dressings with dry ones. The fine mesh ointment gauze was not removed until it was evident that healing had occurred.

The effect of varying the thickness of the skin graft, and the area of the body from which it was taken, on the rate of healing of the donor area is shown in Table II. In all except one patient healing was complete in eight days, in spite of variation in thickness of the skin removed, from 0.012 inch to 0.020 inch, and the fact that there were differences in age, sex, and the regions of the body from which the skin was removed. This obviously means that the rate of epithelial regeneration varies in different patients, as has been suggested by Dr. J. Barrett Brown. Further evidence of this has been obtained from numerous cases where equal thicknesses of skin grafts were removed from the same regions of healthy young adults of the same sex, and who were dressed with the same type of dressings. Under these conditions of control, considerable variation was present in the time required for healing,

ly three and seven days longer to heal than the control areas, while the regions treated with 10% boric acid gauze took two, two and five days longer to heal, respectively, than the control areas.

Recently, Unger and Moorhead³ have reported a few cases in which a liquid concentrate of red cells was thought to aid the healing of burned areas and granulating wounds. They speculate upon the possible stimulating effect of dried plasma and dried red cells. Since there is a free oozing of blood from a donor area it was not thought worth while to try the effect of a liquid concentrate of red cells. However, the effect of dried human plasma and red cells was tried. This material was obtained from the hospital blood bank.* The red blood cells which were obtained by siphoning off the plasma were dried by the same method. No effort was made to match the dried red cells according to the blood group of the patient. The dried plasma and red cells were stored in sterile glass ampoules and at operation the ampoule was

TABLE III.
EFFECT OF VARIOUS OINTMENT BASES ON DONOR AREAS

Name	Age	Thickness of graft	Right	Days	Left	Days
G.McP.	23	0.014	Thigh (antero-medial)		Thigh (antero-medial)	
			Lateral half, Bettman's gauze.....	8	Lateral half, Bettman's gauze.....	8
			Medial half, 3% xeroform gauze ..	15	Medial half, 10% boric gauze.....	10
C.R.	58	0.014	Thigh (antero-medial)		Thigh (antero-medial)	
			Lateral half, Bettman's gauze.....	9	Lateral half, Bettman's gauze.....	9
			Medial half, 10% boric gauze.....	11	Medial half, 3% Xeroform gauze...	12
C.S.	68	0.014			Thigh (antero-medial)	
					Lateral half, Bettman's gauze.....	9
					Medial half, 10% boric gauze.....	14

The next problem for investigation was the effect of different ointments commonly used in treating wounds and donor areas. These were employed both in contralateral areas and on a single donor area. The single donor region was divided longitudinally into two equal areas and these were dressed, one with Bettman's gauze and the other half with either 3% xeroform gauze or 10% boric acid ointment gauze. Comparison of the results in Table III shows that the Bettman's gauze was less adherent and resulted in more rapid healing. In some cases also, the donor areas treated with other ointment gauze (i.e., other than Bettman's) were red and less solidly healed for several weeks after primary healing had occurred than the area treated with Bettman's gauze. Areas treated with 3% xeroform gauze took respective-

opened, the contents were crushed into fine powder to eliminate the presence of any lumps and this was then sprinkled evenly on the experimental area, and covered with Bettman's gauze. The control area was dressed only with Bettman's gauze, and pressure dressings were applied as usual. Both the plasma and the red cell powder were sprinkled over the donor areas in coats of various thickness to see whether there might be an optimum concentration.

Tables IV and V show the results of these experiments. Powdered plasma was used on three patients. In one case, with bilateral donor areas on the thighs, healing was simultaneous, and of two unilateral cases in which the donor

* The plasma was dried by the lyophilization method, through the courtesy of the Ayerst, McKenna & Harrison Company.

TABLE IV.
EFFECT OF DRIED PLASMA ON DONOR AREAS

Name	Age	Thickness of graft	Right thigh	Days	Left thigh	Days
M.B.	24	0.014	Plasma + Bettman's gauze	9	Bettman's gauze	9
T.T.	14	0.014	Plasma + Bettman's gauze	9		
			Bettman's gauze	8		
G.L.	4	0.014	Plasma + Bettman's gauze	10		
			Bettman's gauze	10		

TABLE V.
EFFECT OF DRIED RED CELLS ON DONOR AREAS

Name	Age	Thickness of graft	Right thigh	Days	Left thigh	Days
M.C.	18	0.014	Red cells + Bettman's gauze	9		
			Bettman's gauze	9		
C.S.	68	0.014	Red cells + Bettman's gauze	8		
			Bettman's gauze	8		
L.P.	11	0.012	Red cells + Bettman's gauze	8		
			Bettman's gauze	8		
W.O.	45	0.014	Bettman's gauze	9	Red cells + Bettman's gauze	9

TABLE VI.
EFFECT OF DIFFERENT HORMONES APPLIED TO DONOR AREAS

Name	Age	Thickness of graft	Hormone therapy	Days	Control	Days
G.C.	9	0.014	Left thigh (antero-medial) Hormone + Bettman's gauze (Testosterone propionate, 25 mgm. per grm. applied liberally to wound)	7	Right thigh (antero-medial) Bettman's gauze	7
D.D.	3	0.013	Right abdomen Hormone + Bettman's gauze (testosterone propionate, 25 mgm. per grm. applied liberally to wound)	6	Left abdomen Bettman's gauze	7
A.McD.	21	0.014	Right thigh (antero-medial) Hormone + Bettman's gauze (Testosterone propionate, 25 mgm. per grm. applied liberally to wound)	6	Left thigh (antero-medial) Bettman's gauze	6
C.L.	11	0.014	Left abdomen Hormone + Bettman's gauze (Testosterone propionate, 25 mgm. per grm. applied liberally to wound)	7	Right abdomen Ointment base + Bettman's gauze	7
R.McW.	26	0.016	Right thigh (antero-medial) Hormone + base + Bettman's gauze. (Methyl testosterone, 25 mgm. per grm. in starch powder sprinkled thickly over wound)	8	Left thigh (antero-medial) Powder base and Bettman's gauze	7
M.L.	24	0.016	Right thigh (antero-medial) Hormone + base + Bettman's gauze. (Methyl testosterone, 25 mgm. per grm. sprinkled thickly over wound in starch powder)	10	Left thigh (antero-medial) Base + Bettman's gauze	9
P.R.	9	0.014	Right thigh (antero-medial) Hormone + base + Bettman's gauze (Special). (Testosterone, 20 mgm. per grm. in starch powder sprinkled thickly over half of donor area)	9	Right thigh (antero-medial) Base + Bettman's gauze (Special)	9
C.S.	68	0.014	Right thigh (antero-medial) Hormone + base + Bettman's gauze. (Testosterone, 20 mgm. per grm. in starch powder sprinkled thickly over half of donor area)	8	Right thigh (antero-medial) Base + Bettman's gauze	9
P.S.	9	0.014	Right thigh (antero-medial) Hormone + Special Bettman's gauze. (Testosterone, 20 mgm. per grm. in starch powder sprinkled thickly over half of donor area)	9	Right thigh (antero-medial) Base + Bettman's gauze	9

areas were divided, one healed simultaneously and in the other healing was delayed one day longer than the control area.

The red cell powder was applied on four patients, one with bilateral donor areas on the thighs, and three with unilateral donor areas. In all cases, healing was simultaneous. This obviously suggests that the application of powdered plasma or dried red cells is of no value in accelerating the epithelialization of wounds of this type.

There have been numerous reports in recent years regarding the use of hormones locally to accelerate wound healing.⁵ In view of the work of Schenker, Stevenson and Browne on the effect of testosterone on nitrogen balance after damage it was decided to try the effect of various compounds of testosterone locally on skin graft donor areas. Three preparations were used—testosterone propionate, methyl testosterone and testosterone.*

The testosterone propionate was used in the strength of 25 mgm. per gram in an ointment base. The ointment was spread thickly over the experimental donor area and both control and experimental areas were covered with Bettman's gauze and pressure dressings. Four patients were treated in this way. Healing of the testosterone propionate and control areas was simultaneous in three cases, and the testosterone propionate area was accelerated by one day in one case.

Methyl testosterone was used in a fine inert powder base in a concentration of 25 mgm. per gram. In both cases, healing was delayed one day in the area treated with the hormone.

The final test was made with testosterone in a concentration of 20 mgm. per gram in a powder base. It was employed on three patients. Of these, in two cases the experimental and control areas healed simultaneously, and in one the testosterone area was accelerated by one day.

Summing up the series of nine patients on whom various testosterone preparations were used, healing was accelerated one day in two cases, retarded one day in two cases, and unchanged in five. At present, more extensive experiments are in progress on this problem, but preliminary work indicates that there is no obvious value in local therapy with testosterone

compounds as therapeutic agents in stimulating epithelial regeneration.

SUMMARY

1. A method is described of assaying the wound-healing properties of various agents on man, thereby avoiding many of the difficulties by which similar experiments on animals are complicated. Since the wound created by the dermatome heals almost exclusively by epithelial proliferation and does not undergo scar contraction during healing, it is a particularly suitable method for studying the effect of different agents on epithelial repair.

2. Various ointments and hormones, as well as dried plasma and red blood cells, have been compared with Bettman's ointment gauze with regard to the property of stimulating epithelial regeneration. None of the various substances tested stimulated epithelial repair more than the control ointment gauze. Further experiments are in progress with a variety of other agents, which will be described in a subsequent paper.

3. In many respects, the dermatome donor site resembles an uninfected second degree burn, and, since the variables of depth and site may be so easily controlled, it forms an experimental wound from which much can be learned about the value of various agents in the treatment of burns.

REFERENCES

1. BROWN, J. B. AND McDOWELL, F.: *Skin Grafting of Burns*, J. B. Lippincott Co., Phila., 1943.
2. CANNON, B. AND COPE, O.: *Ann. Surg.*, 1943, 117: 85.
3. UNGER, L. J. AND MOOREHEAD, J. J.: *Am. J. Surg.*, 1943, 59: 104.
4. BLAIR, V. P. AND BROWN, J. B.: *Illinois M. J.*, 1924, Oct.
5. AREY, L. B.: *Physiolog. Rev.*, 1936, 16: 327.

Resuscitation of the drowned is not merely working the bellows of the lungs but a fight to revive cold asphyxiated nerve cells by a circulation of warm blood oxygenated by moving lungs. Our old comfortable confidence in Schafer's method has been roughly shaken: Silvester's method is in many ways better, and the recent rocking method seems more promising still. Uncomplacently we must all "go to school" again. More experiments are badly needed: resuscitation is in the melting pot.—Resuscitation of the Drowned Today, F. C. Eve, *J. Am. M. Ass.*, 1944, 124: 967.

* Supplied through the courtesy of Dr. R. Wolfe, Roche-Organon, Canada.

A STUDY OF SHOCK PRODUCED BY THE INTRAPERITONEAL IM- PLANTATION OF MUSCLE

By J. L. A. Fowler

Department of Medicine, University of Toronto,
Toronto

THE study of secondary or traumatic shock was handicapped at the start of the present war by the lack of reliable methods for producing this condition experimentally. A number of methods have been developed since then, amongst them being the implantation of minced muscle in the peritoneal cavity,¹ which has not been published. Results obtained by this method, have been widely publicized as a result of Moon's monograph.² It appeared that shock could be produced by this method with considerable regularity and with moderately good control over the degree of severity. It was reported² that the implantation of small amounts of muscle, less than 3 grams per kilogram of body weight, led to transient hæmoconcentration with subsequent recovery and that the implantation of larger amounts led to similar changes and to death in almost 100% of cases. Since this technique seemed to lend itself to quantitative study it was decided to make a critical examination of this method with the ultimate object of investigating the value of adrenal cortical extract in shock. There is a considerable body of evidence indicating the parallelism between adrenal insufficiency and shock³ and some observations suggesting that cortical hormones might be of value in the latter as well as the former condition.

METHODS

Healthy adult dogs were used. Food was withheld for 16 hours before the experiments were begun. Observations of heart rate, blood pressure and packed cell volume were made on all animals before the muscle was implanted, as well as after. Blood pressure readings were obtained by femoral artery puncture. The volume of packed red cells was determined on heparinized blood spun to a constant volume at 3,000 r.p.m.

The minced muscle for implantation was prepared from a freshly killed dog. The carcass was draped and skin towels applied over the inner aspect of both thighs after preparing the skin as for a surgical operation. Muscle was obtained through a single incision and minced and bottled, using careful aseptic technique. A quantity of sterile saline equal to half the weight of the muscle was added to the bottle before sealing to make the material more fluid and therefore easier to place in the recipient animal.

* Alexander McPhedran Research Fellow in Clinical Medicine, 1938-40.

The technique of implantation of muscle in the recipient was as follows. The dog was anaesthetized with ether, a right rectus incision made and the minced muscle placed in the peritoneal cavity. In most experiments the muscle was placed in contact with loops of small intestine. In a few cases to be noted it was placed outside the omentum. The abdominal wall was closed in three layers, the operation being completed in about twenty minutes with strict adherence to asepsis throughout. The amount of muscle used in the different experiments is expressed on the basis of the weight of fresh muscle.

Desoxycorticosterone acetate (Schering), and aqueous extracts of the adrenal cortex, both Wilson and Connaught Laboratory preparations, were used in experiments on therapy.

RESULTS

Implantation of fresh muscle.—In a series of 39 dogs in which aseptically prepared fresh minced muscle was implanted in contact with loops of small bowel a mortality similar to that found by Moon was observed. The larger the quantity of muscle implanted, the higher was the mortality. Death ensued most rapidly in those receiving the largest amount of muscle. Hæmoconcentration, fall in blood pressure, tachycardia and vomiting were observed a few hours after implantation. These changes were most severe in those receiving the largest amount of muscle. Table I summarizes the results.

TABLE I.
RESULTS OF IMPLANTATION OF FRESH MINCED MUSCLE
IN CONTACT WITH THE SMALL INTESTINE

Amount of muscle implanted gm. per kg.	Number of animals	Hours survived		Died No.	Mor- tality %
		Range	Average		
2.5 gm.	2			0	0
3.0 "	4	31-60	45	2	50
4.0 "	6	41-77	59	3	50
5.0 "	19	16-72	28	15	79
6.0 "	8	14-38	21	7	88

In order to determine whether the site of the implantation affected the issue, the muscle was placed outside the omentum, near the spleen, in a series of seven dogs. Two of these received 4 grams of minced muscle per kg.; the five others received 5 or more grams per kg. All these dogs survived, and only a few showed hæmoconcentration and tachycardia, though in all some drop in blood pressure was observed. These changes were transient. This result is in marked contrast to that obtained in the previous experiments in which the mortality in dogs implanted with 4 grams or more of muscle per kg. next the gut was 76%.

AUTOPSY FINDINGS

A disagreeable odour was noted in all cases at the time the abdomen was opened. There was a considerable amount of serosanguineous fluid in the peritoneal cavity. This contained many polymorphonuclear leucocytes. The mucosa and walls of the intestine as well as the mesentery were intensely congested. The pancreas was not notably congested. A moderate degree of congestion was present in the lungs. One of the animals was sacrificed after an apparent recovery and was found to have creamy pus in the abdominal cavity. This finding focussed attention on infection as a probable contributing factor in the death of the animals.

INFECTION IN MUSCLE IMPLANTS

Bacteriological examinations were made on the next series of dogs. Swabs of the muscle to be implanted were obtained at the time it was minced and bacteriologically examined.

Eight dogs received muscle negative to swab culture; four of the eight died. Samples of the peritoneal fluid taken at autopsy in each fatality were found to contain many *Cl. Welchii*.

A possible source of contamination appeared to be the air, for great pains had been taken to prevent any possibility of infection of the muscle by contact during its preparation and swabs had been negative in all muscle implanted. Exposure of agar plates showed the operating room air to be laden with *Cl. Welchii*. A few other organisms were occasionally found. It was also shown that all bottles of muscle prepared carefully as described above showed the formation of gas from the growth of *Cl. Welchii* when placed overnight in the incubator at 37° C. These had failed to show any contamination when swabs of such muscle were cultured.

Many variations in the technique of obtaining muscle were instituted, in an attempt to eliminate any contamination of the muscle at the time it was being taken. This included the use

TABLE II.

INCIDENCE OF INFECTION AND MORTALITY IN DOGS IMPLANTED INTRAPERITONEALLY WITH AUTOCLAVED MUSCLE 10 GM. PER KG.

Dog No.	Weight Kg.	Blood pressure		Packed cell volume		<i>Cl. Welchii</i> infection present	Result
		Before implantation	After implantation	Before implantation	After implantation		
		mm. Hg.	mm. Hg.	%	%		
68D	9.5	136	76	49	68	No	Survived
69D	9.9	140	66	44	55	No	"
76D	6.3	170	130	55	66	No	"
84D	8.3	144	126	48	68	No	"
92D	8.7	180	104	50	69	No	"
73D	?	130	110	39	58	Yes	"
72D	13.0	148	0	54	71	No	Died, 16 hrs.
75D	9.2	148	0	49	58	No	" 27 hrs.
97D	8.7	128	0	54	79	No	" 24 hrs.
79D	13.0	180	0	54	70	Yes	" 23 hrs.
80D	11.6	178	0	55	74	Yes	" 20 hrs.
91D	6.5	154	0	38	67	Yes	" 18 hrs.
96D	9.6	135	0	47	54	Yes	" 18 hrs.

The muscle was found to be contaminated with *Cl. Welchii* in about a third of the bottles. Only those samples on which a negative bacteriological report was obtained were used. An interval of 48 hours or more elapsed in these experiments between the obtaining of the muscle and implanting it. This was obligatory on account of the necessity of waiting to see if any growth occurred from the samples of minced muscle. During this time the bottles of muscle were placed in the freezing compartment of a refrigerator. They were thawed by placing the bottles in warm water just before implantation.

of rooms showing no air-borne *Cl. Welchii*. A few specimens only were secured which did not show growth of gas-forming organisms with incubation. The amount of sterile muscle obtained was so small that the elaborate procedures involved were obviously impracticable. A similar conclusion was reached independently by Taylor.⁴

IMPLANTATION OF AUTOCLAVED MUSCLE

The use of autoclaved muscle was resorted to in an attempt to secure sterile material for implantation. Muscle was obtained as before, ex-

cept that no asepsis was observed during collection. After adding a quantity of saline equal in volume to half the weight of the muscle the mixture was boiled for twenty minutes. Boiling was necessary, as freshly minced muscle formed a solid coagulum when autoclaved in the bottles, rendering removal difficult. Weighed amounts of muscle were then placed in bottles which were suitably plugged and autoclaved for 30 minutes at 20 lb. pressure.

Autoclaved muscle when implanted intraperitoneally produced shock but almost three times the weight of fresh muscle was required to achieve a similar mortality. Five to seven grams of autoclaved muscle per kg. did not kill. Ten grams per kg. resulted in death in about 50% of cases. The results on a series of 13 dogs given 10 grams of muscle per kg. are summarized in Table II. Of the seven that died in only 3 were many *Cl. Welchii* found. One other showed a few *Cl. Welchii* on culture of the peritoneal fluid, while negative swabs and cultures were obtained in the other three. The six that survived were subject to repeated paracentesis. Culture of the peritoneal fluid so obtained failed to show growth in five cases. In one instance a great many *Cl. Welchii* were found both by direct smear and culture of the peritoneal fluid. If all animals showing infection are rejected from the calculation the mortality is found to be 37.5%. This represents the lethal effect of the implantation of ten grams of sterile autoclaved muscle per kg. of body weight.

NON-EFFECT OF INTRAVENOUS SALINE ON SURVIVAL OF DOGS IMPLANTED WITH FRESH MUSCLE

Five dogs were studied to determine whether hæmoconcentration or survival would be affected by intravenous saline. Six to eight hours after the implantation of 5 grams of fresh muscle per kg. hæmoconcentration and tachycardia were well established. Sodium chloride solutions were then given intravenously, four receiving 20 c.c. normal saline per kg. and one 10 c.c. of 3% solution per kg. No influence was observed either on the degree of hæmoconcentration or the duration of survival which averaged 32 hours for the 4 animals which died. Infection was probably an important contributing factor in the death of these animals. No data were obtained in this regard, as the experiments were done before the importance of contamination of the implanted muscle was recognized.

NON-EFFECT OF ADRENAL CORTICAL HORMONES ON SHOCK FROM IMPLANTED MUSCLE

Six dogs were treated with large amounts of desoxycorticosterone acetate, 2 to 5 mgm. per kg., and aqueous adrenal cortical extract 4 to 7 c.c. per kg. They also received intravenous saline in amounts similar to those given the dogs in the previous experiment. The hormone injections were begun before the implantation of 5 to 6 grams of fresh muscle per kg. Five of the dogs died. The average duration of survival in these was 30 hours. One animal was living at 4 days when it was killed and autopsied. A large quantity of creamy pus was found free in the peritoneal cavity. Bacteriological checks were not made on the other animals in this series.

Experiments were undertaken to retest the influence of adrenal cortical hormones on the progress of shock and survival after it was determined that it was sometimes possible to produce shock without an associated infection by the use of autoclaved muscle. Six dogs were given autoclaved muscle intraperitoneally (10 grams per kg.). All received at least 25 mgm. desoxycorticosterone acetate before the implantation of the muscle and afterwards a similar amount of desoxycorticosterone plus 3 to 7 c.c. of aqueous extracts of adrenal cortex per kg. in divided dose. All the dogs died. The average duration of survival was 19 hours. The development of the picture of shock differed in no way in these animals compared to untreated controls. Four of the six showed *Cl. Welchii* in the peritoneal fluid at autopsy. Two showed sterile swabs and cultures. If the hormone treatment had had a decisive beneficial action it should have been apparent at least as a prolongation of life in these two. Such was not the case.

DISCUSSION

The mortality following implantation of fresh minced muscle in contact with the small intestine was found to increase with the amount implanted. It was also observed that large amounts of muscle placed outside the omentum did not lead to death. This was tentatively interpreted as indicating that toxic substances were not as well absorbed from the muscle in the latter as from the former site, since much greater dispersion of the muscle and associated fluid occurred when the material was placed against the intestines. The implantation outside the omentum might also have increased the ease

with which the animal could handle infection, in that the foreign material could be walled off more completely.

Infection was almost constantly present in dogs implanted with fresh muscle which was thought to be sterile. Investigation showed that the chief contaminating organism was *Cl. Welchii*. Occasionally other organisms were isolated from the peritoneal fluid at autopsy. No reference has been made to this, as it is hoped to deal at greater length with the bacteriological aspect of the problem and the effect of parenteral and local administration of sulfonamides on the infection associated with the muscle implantation in another publication.⁵ Evidence was obtained that the source of the infection was the air of the operating room in which the muscle was secured, minced and implanted. Operation in non-contaminated rooms resulted in avoidance of the infection at first. Apparently these also soon acquired the organisms or spores, for consistently sterile implantations could not be obtained.

Autoclaving of the muscle was next tried in order to kill whatever contaminants gained access to the minced muscle during the processes of securing, mincing and bottling. When this material was implanted intraperitoneally in dogs much more muscle was required to produce the same symptoms and death of the animals. Autopsy and paracentesis of survivors showed that infection with *Cl. Welchii* still occurred but that the incidence was much reduced. Presumably contamination occurred during the brief process of implantation.

The cause of shock in the animals successfully implanted without contamination would seem to lie, in part at least, in absorption of a toxic substance or substances from the implanted muscle. If one-half the potassium of the implanted muscle were absorbed and equally distributed throughout the extracellular tissues of the host it would account for approximately a 15 mgm. % increase in the blood level of potassium. This is in the lethal range. Such speculation as to the toxic effect of potassium from muscle is supported by the findings of Campbell and Manery, reported by Solandt and Best⁵ that the toxicity of muscle extracts could be accounted for by their potassium content. The absorption of toxic products of infection no doubt also contributed to death in the animals developing infection.

Desoxycorticosterone acetate and aqueous extracts of adrenal cortex had no perceptible alleviating effect on the course of the symptoms and mortality of shock developing in muscle implanted dogs. Only two animals so treated were without evidence of infection, but there was no apparent difference in the course of shock or survival of these compared to the infected animals.

SUMMARY

1. The method of producing shock by the intraperitoneal implantation of minced muscle was found to be complicated by *Cl. Welchii* infection.
2. Autoclaving of the muscle prior to the implantation overcame this difficulty by a certain extent only. A greater quantity of autoclaved muscle was required to produce shock.
3. Large amounts of desoxycorticosterone acetate and aqueous extracts of adrenal cortex had no beneficial effect on the shock produced by the intraperitoneal implantation of muscle.

The advice and encouragement of Prof. Duncan Graham has been of inestimable value in the carrying out of this work. I also wish to thank Dr. R. A. Clegghorn, whose close co-operation and supervision made possible this study, and Dr. P. H. Greey for the bacteriological work done. The technical assistance of Mr. Walter Cowan and Mr. Russel Wilson is gratefully acknowledged.

REFERENCES

1. MOON, V.: Shock and Related Capillary Phenomena, Oxford, New York, 1938.
2. MOON, V. AND KENNEDY, P. J.: The pathology of shock, *Arch. Path.*, 1932, 14: 360.
3. SWINGLE, W. W., PFIFFNER, J. J., VARS, H. M., BOTT, P. A. AND PARKINS, W. M.: The function of the adrenal cortical hormone and the cause of death from adrenal insufficiency, *Science*, 1933, 77: 58.
4. TAYLOR, N. B.: Personal communication.
5. GREEY, P. H., FOWLER, J. L. A. AND CLEGHORN, R. A.: In preparation.
6. SOLANDT, D. Y. AND BEST, C. H.: Studies on the Etiology of Traumatic Shock, Blood Substitutes and Blood Transfusion, Thomas, Springfield, 1942, p. 18.

RÉSUMÉ

On a provoqué expérimentalement le tableau clinique du choc par l'implantation intrapéritonéale de fragments musculaires hachés et on a observé que les animaux en expérience présentaient une complication infectieuse due à la présence dans les fragments musculaires de *Clostridia* de Welch. Les muscles traités par le séjour à l'autoclave ont été partiellement stérilisés puisque des quantités plus considérables étaient requises pour provoquer le choc.

Les grosses doses d'acétate de désoxycorticostérone et d'extraits aqueux de cortex surrénalien n'ont pas réussi à empêcher le choc que déclanche l'implantation intrapéritonéale de muscles fragmentés. JEAN SAUCIER

METRAZOL SHOCK THERAPY ADMINISTERED IN THE GENERAL HOSPITAL*

By J. A. Cummins, M.D.

Hamilton, Ont.

METRAZOL shock therapy was introduced into Ontario in 1938 and was commenced at the Ontario Hospital,¹ Hamilton, in September² of that year. Despite the availability of this treatment, there have been a number of mentally ill persons who were suitable for the treatment but who delayed or refused to come to the Ontario Hospital for it.

The reasons for this have been various. Surprisingly enough, stigmata seem to have been less of a factor than might be expected. The chief obstacle appears to be a reluctance to sever all connections with home and the community for an unknown experience and indefinite period of time. Patients, too, have hoped, with considerable justification, that their illness would terminate without special treatment. This hope has been encouraged by periods of comparatively good mental health and also by the help that they have received from their family physician. In a great many instances, however, as seen later on, many of these illnesses have tended to run for months and often years without any appreciable change or improvement. During this long period the patient is at least uncomfortable and unhappy. Unfortunately, the disability does not end there. The individual, if a breadwinner, usually has to stop work, or, if he continues to work, he does so with much less efficiency. The burden of this inefficiency is borne by his employer, fellow workers and even the public. Invariably also, the home is affected. When a patient receives a good result from treatment, gratitude is expressed as readily from immediate relatives in the home as it is from the patient himself. The relatives, apart from being relieved of a responsibility, again enjoy undisturbed sleep. In the case of young people, friends may once more come into their home. When the housewife or mother in the home is mentally ill, the disruption may very well be greater than when the breadwinner is stricken. Apart from the above catastrophe to the patient and the home most

mental illnesses respond much better to early treatment.

With a view to overcoming the above misfortunes attendant on some mental illnesses, the administration of metrazol shock therapy was commenced at the Hamilton General Hospital and at St. Joseph's Hospital, Hamilton, in October of 1942. In the one year which has elapsed a total of forty-five patients have received treatment in this manner. During the first five months only five patients were treated, actually, one case each month. Throughout the last seven months this work has gained considerably in momentum, and treatment has been administered to 40 persons. Accommodation for patients ranged as follows: private accommodation, 9; semi-private, 15; ward, 10; and out-patient department, 19. In some instances, cases commencing as in-patients derived sufficient benefit from a few treatments to continue as out-patients. Such cases are counted twice. Out-patients come to the hospital in the morning with a friend or relative, who accompanies them home, one or two hours after they receive treatment.

The types of mental illnesses that can be successfully treated at general hospitals are of interest. Every patient in this series had ceased to work because of his mental illness.

In the involutional psychoses only the melancholic type was encountered, of which there were 13. Five in this group had endured their illness from two to four years. In the remaining 8, the duration was one year or less. Symptoms were characteristic. Depression, agitation, and insomnia were invariably present. Agitation was observed as physical restlessness and tenseness. It was expressed by such statements as "Can't stand it any longer"; "What will become of me?"; "Nerves are all gone"; "I've gone all to pieces". Somatic complaints were described as burning pressures in various parts of the body and also as tingling, crawling, and constricting sensations. Two patients said that their stomachs seemed filled to the top because their digestion was not functioning properly and that there was not room for any more food. Headaches were said to be pounding, or like a pressure, or that the head was not clear. General weakness, continual worry, fear and apprehension were common complaints. There was loss of interest including loss of interest in food and resulting loss of weight.

* Read before the Hamilton Academy of Medicine on October 20, 1943.

The age limits were from 43 to 68 years. The length of time on treatment was from two to seven weeks. Throughout the whole series, metrazol treatments were given twice a week. No patient in this group refused adequate treatment. Two cases required special nurses for a short time at the beginning of treatment. Twelve patients returned to work and assumed their former responsibilities. Seven said that they were completely recovered, while five claimed that they still did not feel quite themselves. One, a case of four years' duration, was improved for a time but on the whole was a negative result.

In the manic-depressive psychoses, 12 of the depressed type were treated and 9 of the mixed type.

The depressed types were of short duration, three months or less. Depression of mood and retardation were present in each case. Retardation was observed as slowness in thinking, conversation and conduct. There was loss of interest in everything, including food. Insomnia and general weakness were common complaints. The ages varied from 28 to 62 years. Cases were treated from one to six weeks. Two cases refused adequate treatment. Two cases required special nursing attention early in the course of their treatment. Ten returned to their former occupations. Eight had recovered, two retained some disability and two were negative results.

The duration of the illnesses in mixed group was eight months or less. Depression of mood, agitation, complaints of general weakness and inability to concentrate were the commonest symptoms. The age range was from 21 to 42 years. Treatment was administered from three to six weeks. One patient refused adequate treatment. In this group, seven returned to work, although two still retained some disability. In the remaining two cases, treatment was not helpful.

Eight cases of schizophrenia of the catatonic type received treatment. They were of nine months' duration or less. Six were mildly excited, confused, restless, hallucinated, and delusional. One of these required special nursing care. Two stuporous patients were mute, passively resistive, soiled and displayed *flexibilitas cerea*. Both the latter were 13 years of age. Treatment was conducted from two to four weeks. All cases in this group returned to their former occupations. Seven appeared to be re-

covered. One, although he returned to school, still had some disability.

Amongst the psychoneuroses, three cases of neurasthenia were treated. One of these was a spectacular case. The patient was 57 years of age and had been unemployed for ten years. He had frequently been hospitalized. In his own words he complained of weakness, tiredness, headache and pain in the rectum. He told me that at home when he walked from one room to another, he was so tired that he had to rest, not by sitting down, but by lying down. The headache and pain in the rectum disappeared with one metrazol treatment. At the end of four weeks he was discharged as recovered and he has since procured employment. Two other cases with similar but less marked complaints received treatment for four weeks. One improved and returned to work. The third received no appreciable benefit from the treatment.

SUMMARY AND CONCLUSIONS

For the past year metrazol shock therapy has been administered at the Hamilton General Hospital and at St. Joseph's Hospital in Hamilton. Forty-five patients have availed themselves of this treatment. For some of these, the only alternative was admission to the Ontario Hospital. The majority however, although unable to work or look after their homes, as the case might be, were still able to get along in the community. Invariably, this was a great hardship for others, especially those with whom they lived.

Persons found suitable for treatment at the general hospitals included selected cases of the involuntary and manic-depressive and schizophrenic psychoses and also three cases of neurasthenia. Many cases were treated early in the course of their illnesses and results were accordingly very good. Thirty-nine cases returned to their former occupations. Only three refused adequate treatment.

REFERENCES

1. *Canad. M. Ass. J.*, 1940, 42: 39; and 1942, 47: 326.
 2. *The Psychiatric Quarterly*, 1943, 17: 655.
- The Ontario Hospital.

RÉSUMÉ

La métrazolthérapie est possible dans un hôpital général, chez des malades choisis, notamment chez les mélancoliques. Dans deux hôpitaux généraux de l'Ontario, 45 malades ont été ainsi traités. Sur ceux-ci, 39 sont retournés à leurs occupations antérieures. Ce mode de traitement, très simple, permet d'éviter l'asile à des individus curables. Il s'agit de convaincre les malades de se faire traiter précocement, alors que les signes mentaux ne nécessitent pas encore les mesures de l'asile.

JEAN SAUCIER

THE OLDER WORKER

By Lydia G. Giberson, M.D.

*Metropolitan Life Insurance Co.,
New York*

IN May, 1941, a conference was called in Washington, D.C., its theme-song being "Mental Health in Later Maturity". All aspects of this subject were covered. My part was to discuss "Industrial Aspects of Aging Personnel". I have gone back to reread my original paper in order to pick out some of the ideas and add to them. I have been amazed, however, to find how little need be changed and how much is still applicable. I decided to use all the material just as written, knowing well that it had been published by the United States Public Health Service, (Supplement No. 168), but also knowing how glad they would be to have you have it, shall we say on a Lend-Lease basis, carrying out the Good Neighbour Policy.

In the course of human events history sometimes travels at a gallop, and all nations must brace themselves for the sharp turns ahead. We Americans are travelling somewhere at vertiginous speed, and it would take a far braver and wiser person than I to predict what our social changes are going to be. One can, however, read with relative safety a few of the signs and portents.

For one thing, we as a nation of people are not so young as we used to be, and we are getting no younger fast. The dominant group which sets our national verve and our national characteristics is getting older and older. In almost every national activity the responsible work is being done by men and women over 50 years of age. The age group of 45 to 65 is expanding numerically and politically, and to the financial power always held by this group is being slowly added the democratic weight of superior numbers.

When a strong tide of immigration reverses itself, when the general birthrate drops, when medical skill has increased life-expectancy, and when wartime conditions gobble up our youth, then the general character of the total citizenry must change. In a democracy such as ours, this change exerts an irresistible pressure upon national aims, standards, and practices. It seems inevitable to me that our national safeguards to health and security will be re-

adjusted more and more to suit the needs of men and women over 45. Our new America will never be an oldster's haven, but it will be a nation adjusted more carefully to a later maturity among its citizens.

NEW INDUSTRIAL EMPHASIS ON THE OLDER EMPLOYEE

In American industry the average age of employees has been increasing rapidly, and there are several conditions and pressures which tend to accelerate this change. The present labour scarcity, for instance, has dramatized the importance of, and dependence upon, the older employee. There is a desperate need for skilled men, and labour scouts are receiving as high as a thousand dollars a head for securing trained workers. During the depression years very few apprentices were trained, and now the skilled workers in the higher age brackets are doing the work of two generations, that of their own, and that of the generation that should have been trained to succeed them. Even the vast training program advocated by President Roosevelt will alter only slightly the strategic importance of the older skilled worker.

Our older industries are expanding enormously, and new ones to meet emergency production are springing up overnight. Wartime products put a heavy emphasis upon precision skills, and even where mass production is the aim, there is a crucial interval of precision re-tooling. The basic nature of some industrial ventures is changing profoundly; a sewing-machine company is now turning out shells for Britain, and a locomotive works is fashioning heavy tanks for the United States Army. Every machine shop and foundry will eventually be adapted to producing parts farmed out on a subcontract basis.

In all this the skilled industrial worker, who is apt to be well beyond 40, is Johnny-on-the-spot with a training and accuracy of judgment which no emergency program can rapidly produce. The pressure of events will send younger men around him to supervising positions, but the strategic importance is his alone. He grows older by the year and by the average, but his numbers and his powers increase too.

Two other general developments tend to sustain the importance of the older employee. First, the technological shift from handcraft skills to maintenance skills through the wider

use of automatic machinery opens a field where the physical qualifications are such that he can compete on equal footing with younger workers. Second, the imminent development of a great American merchant marine will draw countless young men into a trade where their youth will never constitute a threat to the older industrial worker. It would seem that the present importance of the industrial workman over 40 is secure for some time to come.

THE CLASH OF OPINION

There are those in industry and elsewhere who view with misgivings this dependence upon the older industrial worker. The whole subject of the efficiency and value of the upper-age brackets in industry is, in fact, rife with prejudice and clashing opinion. One side, representing perhaps the major group, claims that the worker about 45 is too "set" in his ways for efficient production, too difficult to teach, and too poor an industrial investment to hire or even to keep on the active service list. The other side claims that the judgment, skill, and proved character of the worker above 50 constitute the most valuable resource of an industrial concern, and they point proudly to men of 80 in their plants who are still producing efficiently. Still another group claims that an age-problem does not exist, that the efficient characteristics of a worker are independent of chronological age.

The remarkable thing in this confusion is the lack of any tested data. A really comprehensive and objective study still remains to be done. There is quite clearly an age-barrier, a chronological point past which the worker becomes uneasily aware of a lowered industrial desirability. A New York Legislative Committee listed these reasons for the barrier in 1938: (1) Introduction of private pension plans, group insurance, and workman's compensation. (2) Physical and mental characteristics affecting efficiency and adaptability. (3) Promotion policies. (4) Lower wage costs of younger workers. (5) Technological changes.

To these may be added the following more specific reasons for an age-problem: (1) Hiring-age prejudices. (2) The myth of the old dog and new tricks. (3) The lack of any industrial plan to extract benefits from the aging employee's changing capacities. (4) Lack of specific medical facilities adapted to the needs of this group of employees.

All these reasons are helpful in understanding the age problem, but, more so, perhaps, is the sort of work done by the Harvard Fatigue Laboratory. Doctors from this group decided that the assumption that there is a rapid decline after 40 years of age in the quality and quantity of work is a "social myth, which, though in some respects not misleading, is in general grossly inconsistent with the evidence—the rate of decline in capacities after 45 has been greatly exaggerated. There is little reason for taking the position as a ground for action that in general men over 45 years of age are less effective than others in industrial occupations." My own experience in industry would lead me to agree with these last findings. I would add only that I have found them also true for women working in industry.

THE NORMALITY OF THE OLDER AGE GROUPS

To put the matter clearly, the industrial workers of 45 to 65 years of age constitute, in my opinion, a normal group of workmen, and by this I mean normal as judged by almost any set of standards. Socially, medically, and industrially they are comparable to their age group anywhere, and when they are calibrated properly against lower age groups, they are not necessarily apt to come off with the lowest score. When this group is criticized, I should like, just for the record, to have the critic state clearly his own age and his expectancies.

True enough, there are unwelcome traits and personality difficulties characteristic of this group as a whole, but from an industrial viewpoint these need be no more troublesome or cause for inefficiency than those of any other age-group. If certain adjustments in management and methods were made to meet the special problem of this group, and if no more emphasis were placed upon those problems than upon those of other age-groups, in all probability these workers would present a normal picture of health, security, and efficiency.

As matters stand in industry today, this group rarely achieves its proper status, and the basic reason may be the universal fear of old age, the layman's confusion of geriatrics with gerontology, of the process of aging with the finished result. As Dr. E. J. Stieglitz observed quite justly in a recent article, the specialty of geriatrics has little direct concern with industry, for the truly senile are pen-

sioned off. Yet this confusion exists everywhere, even in the minds of the older workers themselves; the prospect of growing old in industry has never been made very attractive to the American worker, and one can understand quite readily why he encounters emotional difficulties at 50.

There is little concrete evidence for distrust of the older worker's abilities. Accident rates are somewhat higher, but they would be lowered if work conditions and work types were properly adjusted to the physiological changes which occur after age 45. Absenteeism is less, but of longer duration to the individual case. Organic maladies seem on the surface to be more frequent, but to substantiate this claim the labour turnover statistics of other age-groups would have to be probed carefully. It is important to remember, also, that individual differences increase markedly with age, and the statistical methods used on lower age levels will not be applicable in these upper groups.

The compensations which advancing years bring, both physically and mentally, have always been understressed. The main point is that workers in this group have rarely had a chance to appear at their best. The personality traits and emotional patterns usually listed as detrimental are often as not, the result of the defeatist and antagonistic attitudes displayed toward them. The older employee has had to make his difficult transitions by himself. The years 45 to 65 open and close with a high emotional hurdle, the menopause and the retirement crisis. For these, the worker has had no effective aid, and the years between have been mal-formed sadly by his own misconception of the aging process.

THE FIRST EMOTIONAL HURDLE

The nature of the menopause in the female needs no elaboration here; its incidence has been recorded and its treatment set down. Less commonly understood, though, is a comparable age alteration in the male. The emotional change in the male occurs between 50 and 60 and exhibits crises remarkably similar to those of the feminine menopause. When these crucial changes occur among industrial workers the whole working pattern is disrupted. As one might suppose, all sorts of personnel problems arise, and workers with many years of splendid service may begin to commit indiscretions. Such conduct may be inexplicable to the layman, and the

employees are not infrequently penalized severely. Foremen and supervisors are baffled and labour incidents are just around the corner.

Common sense dictates some medical care and understanding, but these are not always available. The depressed mental cycle through which so many go at these periods should be recognized and proper steps taken. When the basic readjustments of the menopause are made reasonably and sensibly—and with medical help they can be—the individual may be enriched by the experience. But, if the changes are made in an atmosphere of ignorance and intolerance, the resulting injuries may be carried for a long time, and the worker's efficiency may be permanently decreased.

THE RETIREMENT CRISIS

The retirement crisis looms as a hurdle throughout the whole age-period. It is exceedingly difficult for anyone to effect a graceful exit from the economic stage, and for the industrial worker the art is very hard to practise. He needs, more than most, some expert coaching on facing the audience and taking his cues promptly. Retirement looms up ahead of him as a dread thing, the end of his importance to himself and to his company. He fears the incompleteness which his remaining years promise him. He is utterly unprepared for leisure. He is inarticulate about this, of course. His fears may come out in cantankerousness and officiousness, and he may try the patience of a whole organization before he retires.

Surely something can be done to ease the awkwardness of this situation, some gradual retirement plan which would acclimatize the worker to his new leisures and new horizons. We know, all of us, the medical dangers of sudden retirement, the non-adaptation to new routine, the lethal cessation of physical activity. Mentally, too, there is the danger of an aggravated irritation, of childish and unsocial petulance that may transform a fine citizen into a liability. These dangers can be avoided by an active program set in motion years before retirement. The worker's imagination could be kindled at the possibilities of the leisure opened up for him upon retirement. Leisure clubs might be organized for instance, where all the colourful details of fishing, gardening, or useful social activities are emphasized and made available. A good program would include some concrete evidence of the esteem and

respect in which the older employee is held. Certainly, in the interests of general morale, and in the efficient use of its resources of skill and judgment, industry itself should arrange some means of keeping in direct contact with its retired employees. Such precautions as these are not impractical; they are merely prudent savings of morale and skill.

THE YEARS BETWEEN

The years between these two emotional hurdles may find the older worker at his best and most normal. What are some of his characteristics and how does he look at himself? Briefly:

He may exhibit some loss of coordination and in physical endurance, but these are compensated by a gain in judgment and in working skill. Slight adjustments in working conditions and in speed rates are apt to make him even more efficient than younger workers. He is reluctant to change his ways, but his reluctance stems mostly from caution. The older employee is apt to be settled in a routine with orderly habits. These have created the only world he knows, and he has invested a lifetime in that world. Any sudden change threatens his world and his investment. Most of his trouble on this score is caused by his inability to make a transition from older to newer conditions. Perhaps a transition can be engineered for him, or at least his own made easier.

He is haunted by the threat of exclusion, and he feels a discrimination where none exists. He is no longer rich in time and energy, and his knowledge of his own limits sets him apart from younger employees as effectively as his gray hair. He is cautious about new things because he has so little energy to spend; when a new road opens up he knows that he can go only part of the way, and that he may not be around long enough to see any fruit from his efforts. He is apt to feel left behind and unconsidered; such a feeling can, in extreme cases, develop into sickness. The sequence leads through the feelings of being unwanted, barely tolerated, suspicion of ordinary motives, fancied cruelty, to paranoid retaliation.

He is jealous of his dignity. When a man works for years making objects that disappear as soon as made, he has nothing tangible left to indicate his expenditure of energy; his only remaining gauge of success or failure is the attitude shown toward him by his superiors

and his fellow workmen. Respect shown him is proof that he has not been a failure.

He is quite often deeply bored and unconscious of that fact. He has a hunger for significance, but the symbols about him do not add up into something personally important. Though he would deny this vehemently, his job and his home have become worn and threadbare. He needs a change of pace and an autumn tonic.

He has a dread of insecurity, both in the economic sense and in the sense of dependence upon warm human contacts. These feelings are usually accompanied by a rankling sense of unfairness. He is as good as he ever was, yet should he be insubordinate and lose his present job, he would be unable to secure another one. He feels caught in a trap with, possibly, unprotected and meagre old age ahead. Retirement, even on pension, will destroy his present life and offer no comparable life in exchange.

These observations about the older worker are general and interpretative. They appear in no such clarity to the worker himself, but, allowing for individual variability, they can be traced as the starting point for many psychiatric cases.

PRECAUTIONS AND OBJECTIVES

Some simple objectives for aiding the older employee might be kept in mind:

First, reassure the man indirectly by making retirement attractive and natural. Remove his fear of insecurity by full explanation of his compensation and pension payments. Give him, where it is possible, pre-retirement training in a leisure vocation.

Second, keep his dignity intact. Insist upon courteous treatment from all other employees and from management. Make his contribution to the company objective, that is, give him something by which he can measure his useful life. Count him in on company action both before and after retirement.

Third, capitalize upon his experience. Use him as a teacher, as an organization man in company activities, as an adviser. Make him vocal, make him offer suggestions.

THE BROADER READJUSTMENTS

These simple objectives are fair enough for a starter, but for an honestly dignified attack upon the problem, a broader and more carefully integrated plan is needed. The older employee

must be fitted into the industrial structure; it is not enough that he be merely "taken care of".

One supposes that some functional plan of training is essential. Since the potential capacities of the worker vary so with increasing age, some method must be found to utilize these capacities at their peak of efficiency. The industrial worker literally grows out of his job, and he should, just as literally, grow into another one. As his capacities change, so should his job change, and his industrial life should be a smooth progression of proudly developed and proudly exploited abilities. Is such an ultra-liberal policy of job training and job placement impossible? I do not think so. True, it would require an about-face in most industrial thinking, but even that is not unheard of.

Perhaps a start in tapping the ripe experience of the older worker might be made by enlisting him in a training program where he would act as a mentor and adviser for one or more apprentices. He might be a tutor or an industrial godfather who would open his mind and perhaps his home to the newcomer. In this way the beginning and the end of industrial working would be brought together, and the whole process would assume more meaning and dignity. The older employee would benefit in pride and dignity; the company would profit in many ways; and the apprentice, by good or indifferent example, would be brought to a more mature consideration of an integrated living pattern.

We have made our older employees older than they need be. Many of them are uncompleted, unused. They have unutilized riches of maturity and judgment which challenge our industrial society. Perhaps we can begin to meet that challenge when all of us realize with mind and emotions that old age is neither a visitation nor a penalty, but rather an achievement and a reward.

RÉSUMÉ

Il faut prendre conscience du fait que les travailleurs d'âge mûr deviennent plus nombreux et que la guerre a créé une situation qui grève énormément leur effort déjà considérable. Les avis sont partagés à propos de l'efficacité du travail des vieux employés. Il est probable que le préjugé de leur inefficacité est injuste. Les travailleurs compris entre 45 et 65 ans ne sont pas suffisamment aidés et ils s'infligent un état affectif de défaitisme contre lequel on ne fait rien. A l'époque de la ménopause, l'intolérance devrait être remplacée par un essai loyal de co-opération et d'assistance médicale. Il faut également préparer l'étape inévitable de la retraite en organisant les loisirs futurs. De cette façon on améliorera le rendement de la période de

travail qui précède la retraite. Il faut conserver au travailleur sa dignité, le rendre conscient de l'estime que l'on a pour lui et préparer sa retraite en lui faisant sentir qu'il fait toujours partie du groupe qu'il va quitter, ne serait-ce qu'à titre d'aviseur. Il faut croire que la vieillesse n'est pas une punition mais une récompense.

JEAN SAUCIER

ROLE OF THE HYPOPHYSIS IN THE PATHOGENESIS OF THE DISEASES OF ADAPTATION*

By Hans Selye, M.D., Ph.D., D.Sc., F.R.S.C.

Montreal

IN previous communications, published in this *Journal*,^{1, 2} it was shown that overdosage with desoxycorticosterone acetate (D.C.A.) causes a malignant type of nephrosclerosis, hypertension, periarteritis nodosa and certain cardiac changes reminiscent of rheumatic nodules or Aschoff bodies. Subsequent work³ showed that under certain conditions overdosage with this same corticoid hormone may lead to marked swelling of the joints accompanied by hyperemia, pain and histological changes characteristic of rheumatic arthritis. All these lesions were more easily produced in partially nephrectomized animals kept on a high salt diet, than in intact controls kept on a normal diet.

Earlier work concerning the physiology and pathology of adaptation had revealed that following exposure to a variety of nonspecific damaging agents (*e.g.*, cold, trauma, intoxications, infections) the adrenal cortex is enlarged and shows signs of increased endocrine activity. This is especially true of the first, acute stage of adaptation to noxious agents, the so-called "alarm reaction", but to some extent the adrenal appears to be enlarged and hyperactive even when the organism becomes adapted to continuous exposure, that is, during the "stage of resistance" of the general adaptation syndrome. If exposure to the noxious agents is still further prolonged, the adrenal may eventually break down and during the last phase of the adaptation process, "the stage of exhaustion", large areas of a necrosis appear within the parenchyme of the suprarenal gland.⁴ It has been assumed that the increased production of corticoid hormones during the alarm reaction and

* From the Department of Anatomy, McGill University, Montreal.

the resistant stage is beneficial inasmuch as it increases the capacity of the body to adapt itself to damaging agents and to combat their detrimental effects.

In these early experiments we failed to examine whether over-production of the corticoid hormones would eventually have its drawbacks. Our attention was called to this possibility by the above-mentioned experiments concerning the detrimental effects of D.C.A. overdosage. Since the toxic actions of D.C.A. are most manifest in partially nephrectomized animals maintained on a high salt diet, we repeated the earlier work, but using rats sensitized by partial nephrectomy and a high NaCl intake. In the course of this work it became obvious that nephrosclerosis and malignant hypertension may be elicited in the rat by exposure to nonspecific damaging agents especially by exposure to cold. This was tentatively interpreted to signify that even the natural corticoids, as produced by the adrenal cortex under stress, can cause pathological changes. It was postulated, therefore, that as a defence against stress the adrenal produces an excess of certain corticoids and that this response is beneficial as far as the immediate maintenance of life is concerned, but that, in the event of chronic exposure, it has its drawbacks because of the resultant overdosage phenomena. In the light of these observations malignant nephrosclerosis, hypertension, periarteritis nodosa, and perhaps even some of the so-called rheumatic heart and joint manifestations appear to be "diseases of adaptation" due to the secondary, detrimental effects of a fundamentally useful, defensive, overproduction of corticoid hormones.

Since the production of corticoids is under the regulating influence of the anterior pituitary, it was considered necessary to investigate the possible rôle of the hypophysis in the production of the diseases of adaptation. Such an investigation appeared all the more profitable since it is known that diseases due to pituitary overactivity, especially acromegaly and Cushing's disease, are frequently conducive to the developments of nephrosclerosis, hypertension and adrenal cortical hypertrophy. In an effort to elucidate these interrelations, a series of experiments was performed on rats treated with anterior lobe extract and sensitized to the development of adaptation diseases by partial nephrectomy and a high salt intake.

EXPERIMENTAL

In our first series 16 female albino rats weighing 40 to 52 gm. (average 46 gm.) were subjected to ablation of the left kidney and immediately afterwards they were given a 1% NaCl solution instead of drinking water. Half of these rats were not otherwise treated and acted as controls, while the other half received two daily subcutaneous injections of 0.2 c.c. of an alkaline pituitary extract. The extract is merely one of the many modifications frequently used for experimental work and was prepared as follows: 50 gm. of dissected cattle anterior pituitary tissue are ground up with 12 gm. of sand. Then 124 c.c. of distilled water are added, while the grinding of the tissue continues. After this 69 c.c. of N/5 NaOH are added, the mixture being stirred for five minutes and then placed in a refrigerator for 24 hours. After this the extract is neutralized with N/5 acetic acid (about 50 c.c.) until the pH is 7-7.5. The supernatant fluid is separated from the precipitate and 10% ethanol is added to the former as a preservative.

Following 18 days of this treatment the animals of both groups were sacrificed. Table I gives the average weights and (in brackets) the spread, of those organs which appeared to be of particular interest. Immediately after dissection the organs were fixed in Suza solution and then weighed on an analytical balance.

Perusal of the data clearly indicates that even in this short experiment treatment with the

TABLE I.
ORGAN WEIGHTS FOLLOWING TREATMENT
WITH PITUITARY EXTRACT
(Body weights in grams, all other weights in milligrams)

Organs	18-day experiment		60-day experiment	
	Extract treated	Controls	Extract treated	Controls
Final body weight	131 (100-153)	99 (90-110)	205 (175-245)	157 (145-175)
Kidney	1380 (1180-1630)	863 (770-990)	2150 (1910-2730)	1222 (970-1480)
Liver	10530 (8660-12140)	6160 (5000-7590)	14327 (12940-17115)	7670 (7100-8545)
Spleen	2116 (1650-2810)	1050 (890-1250)	2390 (2180-3400)	981 (600-1482)
Heart	763 (710-850)	518 (470-570)	1193 (1090-1370)	820 (707-1000)
Adrenal	63 (53-72)	34 (28-35)	153 (120-180)	53 (44-58)
Thyroid	16 (12-18)	12 (9-15)	18 (15-21)	16 (13-19)
Ovary	63 (31-106)	20 (12-32)	35 (22-66)	62 (42-59)
Pituitary	4.5 (3.6-5.3)	4.7 (3.6-6.0)	7.7 (6.4-9.0)	9.2 (7.8-10.2)

anterior lobe extract slightly accelerated body growth and at the same time caused a very pronounced enlargement of the kidney, liver, spleen, heart, adrenal, thyroid and ovary. With the possible exception of the heart and thyroid weights, the enlargement of these organs appears to be significantly greater than the increase in general body size. It has long been established that specific "tropic" hormones are responsible for the selective enlargement of the endocrine glands by anterior lobe injections. It appears highly probable that the adrenotropic, thyrotropic and gonadotropic hormones, which were present in our extract, fully account for the enlargement of these organs. It is well known that patients suffering from acromegaly and animals treated with anterior lobe preparations develop splanchnomegaly. This has generally been interpreted as due to the action of the growth hormone which stimulates body growth in general and consequently would also increase the size of the various organs. However, this explanation is not entirely satisfactory. The increase in the weight of the kidney, liver and spleen is proportionately much greater than could be expected were it merely a consequence of growth hormone action. Hence the possible existence of specific pituitary renotropic, hepatotropic, splenotropic and cardiotropic principles must be considered. It should be admitted, on the other hand, that enlargement of the kidney, liver and spleen may have been due exclusively to growth hormone action if we assume that these organs are merely more prompt in their response than the rest of the body. However, this alternative is not very probable, because, if such were the case the growth of these organs would precede that of the body as a whole, even in the process of normal growth due to endogenous growth hormone production. Experiments are now under way in this laboratory in which fractionation of the hepatotropic, renotropic, splenotropic and growth hormone principles is attempted in an effort to demonstrate whether any or all of these are actually chemically separate entities.

Histological examination of the organs revealed that the kidney is merely enlarged but otherwise essentially retains its normal structure (see Figs. 1 and 2). The condition is somewhat similar to that produced by renotropic steroid hormones as previously described.^{5,6} The main difference is that unlike the reno-

tropic steroids, the pituitary extract appears to enlarge the glomeruli as well as the convoluted tubules, thus causing a more proportionate renal growth. The main interest in this experiment lies in the fact that even following sensitization by unilateral nephrectomy and salt treatment (that is to say under conditions most favourable to the development of nephrosclerosis) a dose of the pituitary extract sufficient to enlarge the kidney so markedly did not cause any renal damage attributable to the overproduction of D.C.A.-like hormones by the enormously enlarged adrenal.

The liver, spleen and heart also proved to be merely hypertrophic, but otherwise essentially normal. Occasional mitotic divisions of liver cells indicated the possible existence of some hyperplasia in addition to the hypertrophy. In the spleen the enlargement was due mainly to an increase in the white pulp, while in the heart the weight increase resulted from hypertrophy of the individual muscle fibres. The adrenal cortex, thyroid and ovary showed the usual signs of stimulation by the corresponding tropic hormones and hence do not deserve detailed discussion here.

The second experimental series was conducted specifically to determine whether the anterior lobe extract could, through adrenal cortical stimulation, elicit an endogenous overproduction of the D.C.A.-type of corticoids in quantities sufficient to duplicate diseases of adaptation, especially nephrosclerosis and cardiac lesions. For this purpose a series of 16 female albino rats weighing 42 to 60 gm. (average 50 gm.) were unilaterally nephrectomized and placed on 1% NaCl solution instead of drinking water. Half of the animals received two daily injections of 1 c.c. of the pituitary extract, that is, five times the dose used in the previous series. Furthermore, treatment was continued for 60 days since it was felt that such intense and chronic overdosage would have the best chance of producing lesions similar to those typical of the diseases of adaptation. At the end of this experimental period, the animals were sacrificed and their tissues were fixed, weighed and histologically examined as in the previous series.

Perusal of Table I clearly indicates that the kidneys, livers, spleens and hearts of the treated animals showed an even more pronounced enlargement than in the 18-day experiment. With the possible exception of the heart,

here again the enlargement of these organs was proportionately greater than the increase in body weight. The pituitary showed a slight decrease in size, perhaps as a result of compensatory atrophy. The ovaries were markedly involuted, probably due to anti-gonadotropic hormone formation, while the comparatively inconspicuous increase in thyroid size may perhaps be explained on the basis of anti-thyrotropic hormone formation. The adrenals, on the other hand, were tripled in size exclusively as a result of cortical enlargement.

Histologically the most significant changes were seen in the kidneys which, in addition to the tubular and glomerular hyperplasia characteristic of a renotropic action, revealed definite signs of nephrosclerosis in the form of glomerular hyalinization, arteriolonecrosis, dilatation of tubules and hyaline cast formation. There is no doubt that these changes are essentially identical with those produced by D.C.A. overdosage (see Figs. 3 and 4).

In the heart muscle there were, in addition to muscular hypertrophy, many nodules of proliferating granulomatous tissue and patches of hyalinization. These nodules bear a great resemblance to the Aschoff nodules characteristic of rheumatic carditis. In these nodules we find many myocytes, with their typical "caterpillar" nuclei, as well as polymorphonuclear giant cells. Yet the frequent occurrence of periarteritis nodosa in the cardiac vessels, as well as the comparative rarity of large polymorphonuclear giant cells, distinguishes these nodules to some extent from those of rheumatic fever as seen in human pathology. In any case, it may safely be said that the lesions produced by the anterior lobe extract are identical with those elicited in the rat by D.C.A. under similar conditions (see Fig. 6).

Periarteritis nodosa was rarely very marked, but clearly distinguishable in several animals of the treated group especially in the pancreatic and adrenal vessels (see Figs. 5, 10 and 11).

The adrenals showed signs of pronounced cortical hyperplasia and hypertrophy. Within the adrenal cortex some of the epithelial cells occasionally appeared to fuse, forming large polymorphonuclear giant cells which bore a striking resemblance to foreign body giant cells and to the typical Aschoff cells of human rheumatic fever. The vessels, especially in the capsule of

the adrenals, were frequently the site of periarteritis nodosa. Perhaps due to vascular disturbances resulting from such changes or possibly as a result of final exhaustion following prolonged stimulation, large areas of necrosis developed within the adrenal cortex in several instances. In one animal there was bilateral necrosis of almost the entire medulla and cortex of the adrenals (see Figs. 10 and 11). These observations are compatible with the assumption that the changes in the kidney and the cardiovascular system may have been secondary to the endogenous overproduction of the D.C.A. type of corticoid hormones and that following continued adrenotropic stimulation, the overactive tissue eventually breaks down. The comparatively frequent occurrence of bilateral adrenal necrosis, which is conducive to secondary infection of the adrenals and eventually leads to the development of Addison's disease, may perhaps be explained on the basis of such a tissue collapse caused by prolonged overstimulation.

We have previously mentioned³ that an excess of thyroid hormone may—especially in nephrectomized, salt-treated rats—also produce cardiovascular lesions similar to those caused by D.C.A. Hence it is possible that in the present experimental series the endogenous stimulation of thyroid hormone production, occasioned by the thyrotropic hormone content of the extract, may have contributed to the development of the cardiovascular lesions described above. However, since the extract was not very rich in thyrotropic hormone content, this factor was probably not of great importance.

Histological study of the livers revealed marked hypertrophy of the epithelial cells with a particularly pronounced enlargement of their nuclei. Many of these nuclei were very vesicular in appearance and their diameter was extremely variable. The unusually large number of binucleated and even trinucleated liver cells was striking. This may be regarded as an indication of active cell division, although actual mitoses were not very frequently detectable. Occasionally large giant cells, similar to those seen in the adrenal, were present within the hepatic tissue. Many of the epithelial cells were in a process of necrobiosis exhibiting a dense, small nucleus and a comparatively dark amphophilic cytoplasm. However, in general, the lesions were distinctly proliferative and compatible with

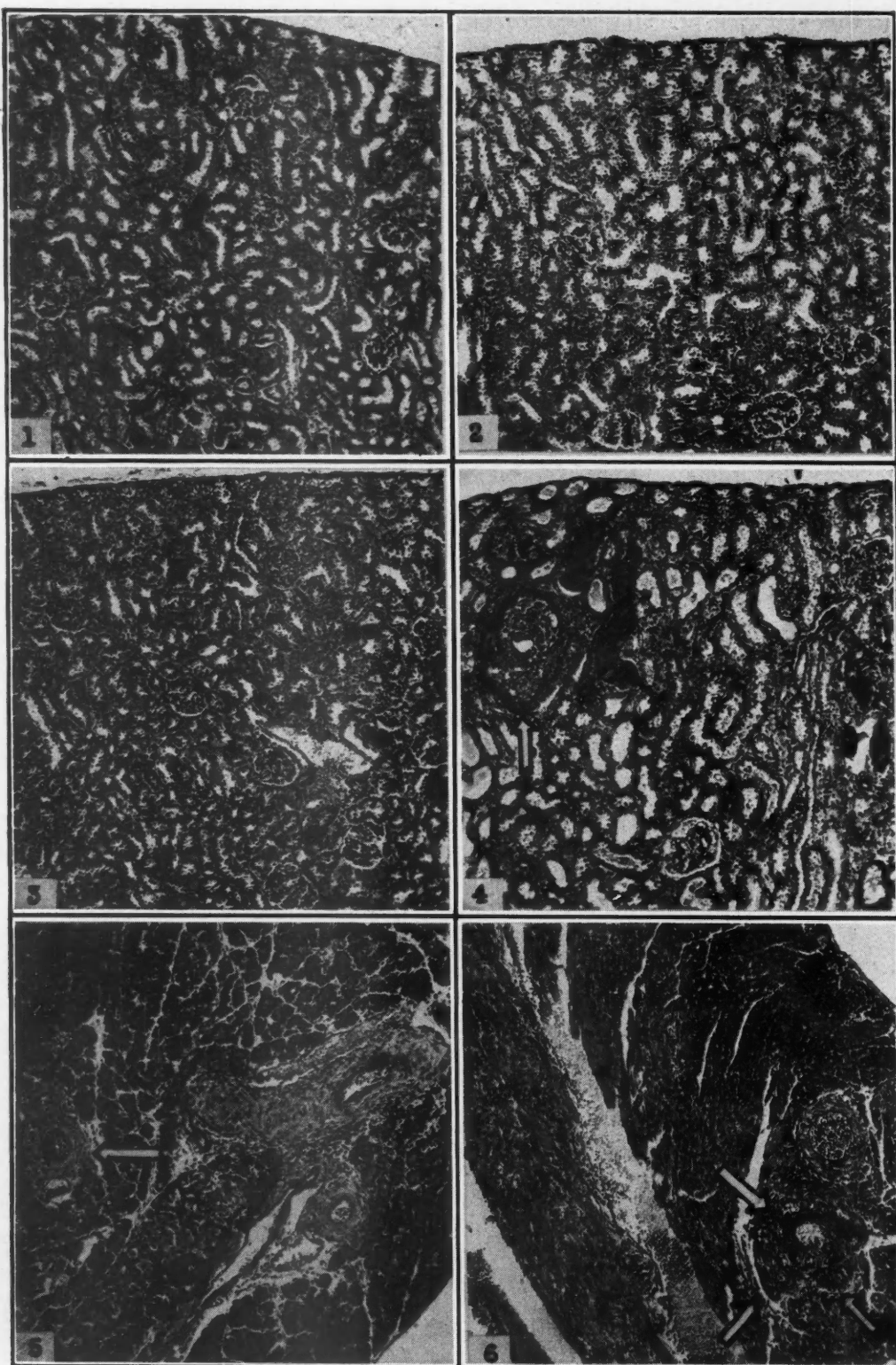


Fig. 1.—Kidney of untreated control rat in the 18-day experiment. **Fig. 2.**—Kidney of pituitary extract treated rat in the 18-day experiment. Note enlargement of both tubules and glomeruli but absence of degenerative changes. **Fig. 3.**—Kidney of untreated control rat in the 60-day experiment. **Fig. 4.**—Kidney of pituitary extract treated rat in the 60-day experiment. The arrow indicates a greatly enlarged and partly hyalinized glomerulus to the right of which some of the dilated tubules are obstructed by hyaline casts. **Fig. 5.**—Periarteritis nodosa in the pancreas of a pituitary extract treated rat of the 60-day experiment. The arrow points to a small arteriole whose lumen is almost completely obliterated by thick subendothelial hyaline deposits. The medium sized artery to the right shows partial hyalinization of the intima with dark spots of necrotic material in the media. **Fig. 6.**—Nodules in the cardiac muscle of a pituitary extract treated rat of the 60-day experiment. Three arrows demarcate a patch of hyalinized connective tissue and muscle fibres. The subendocardial region at the left of the picture is heavily infiltrated by granuloma tissue.

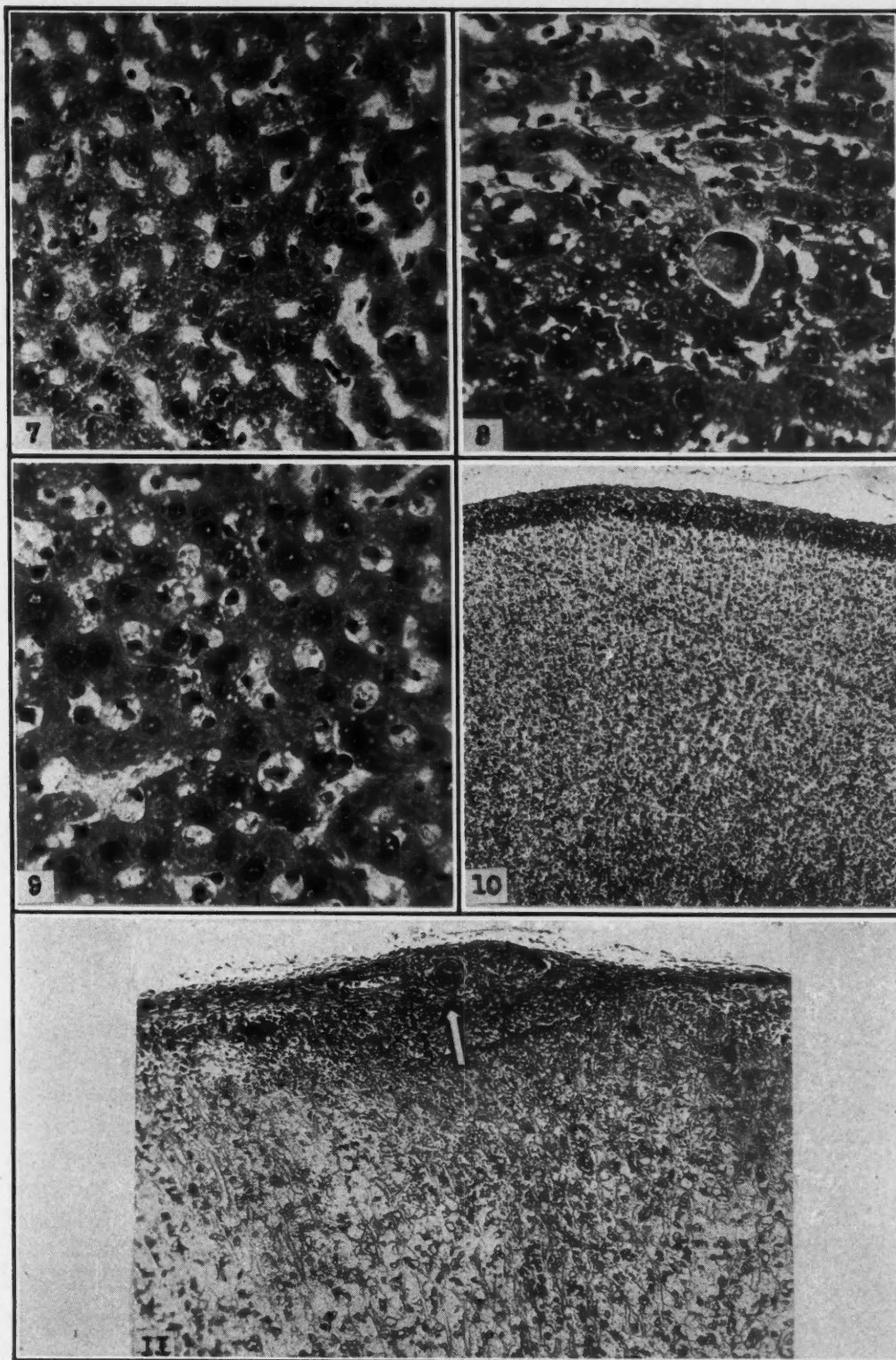


Fig. 7.—Liver of untreated control rat in the 60-day experiment. **Fig. 8.**—Hyperplastic liver cells in a pituitary extract treated rat of the 60-day experiment. Note the polymorphonuclear giant cell in the middle of the field. **Fig. 9.**—Another region of the liver shown in Fig. 8. Note great irregularity of nuclear size and large number of binucleated hepatic cells indicative of active hyperplasia. Both in Figs. 8 and 9 the enlargement of the cells as a whole and especially of some among the nuclei is very prominent. The dense hyperchromatic nuclear structure of some cells is probably indicative of necrobiosis. **Fig. 10.**—Adrenal cortex of untreated control rat in 60-day experiment. **Fig. 11.**—Almost completely necrotic adrenal of pituitary extract treated animal in 60-day experiment. Only a thin layer of subcapsular cells appears to be preserved. The arrow points to a capsular arteriole revealing thick subendothelial hyaline deposition characteristic of periarteritis nodosa.

the view of a true hepatotropic, that is liver-growth-stimulating, action.

The lesions in the other organs were essentially the same as in the 18-day series and hence they need not be discussed here, although it must be emphasized that—as stated above—the ovaries were atrophic.

DISCUSSION

The above experimental series clearly indicates that anterior lobe hormones can exert renotropic, hepatotropic, and splenotropic actions in excess of their general body growth stimulating effect. They also show that under special experimental circumstances anterior lobe extracts can produce nephrosclerosis and other lesions similar to those elicited by excessive doses of D.C.A.

It is known that the adrenal cortex produces at least three types of hormones which differ in their pharmacological effects. These are the so-called sugar active (*e.g.*, corticosterone), salt active (*e.g.*, D.C.A.) and testoid (*e.g.*, dehydroisoandrosterone) hormones. It is very probable that these three groups of hormones may be produced in different proportions, that is to say, under certain conditions the adrenal cortex may selectively elaborate sugar active, salt active and testoid compounds. Since the secretion of all adrenal hormones is under the control of the anterior lobe, it would follow that there are three distinct adrenotropic principles which are responsible for the production of the three types of cortical hormones. Indeed, it is possible—though unproved—that the number of adrenotropic hormones is even greater, since up to the present time twenty-eight steroid compounds have been prepared from the adrenal cortex.⁷ It has been demonstrated that under the influence of non-specific damaging agents such as are operative during the alarm reaction, the resulting adrenal enlargement is not accompanied by an increased production of testoid compounds.⁸ Albright,⁹ in his Harvey lecture, postulates that in various pituitary and adrenal diseases different proportions of sugar active and testoid compounds may be produced and assumes that in the alarm reaction there is a preponderant elaboration of sugar active corticoids. The present experimental series makes it probable that the D.C.A. type of salt active corticoid may also be selectively elaborated by the adrenal under the

influence of adrenotropic stimuli. If this is correct the diseases of adaptation, as outlined above, would appear to result from an excessive production especially of those adrenotropic hormones which elicit an overproduction of the salt active or D.C.A.-type of compounds.

SUMMARY

Experiments in the rat indicate that an extract prepared from the anterior lobe of the pituitary, when given in comparatively small doses, may produce a selective enlargement of the kidney, liver and spleen. This organ growth-promoting effect is proportionally greater than the general body growth-stimulating action of the same preparation. The enlargement appears to be due to a true stimulation and is not accompanied by any detectable degenerative lesions.

It was possible to demonstrate on rats specifically sensitized to desoxycorticosterone acetate (D.C.A.) overdosage by partial nephrectomy and salt treatment, that more prolonged and intense treatment with the same extract produces nephrosclerosis, periarteritis nodosa and cardiac changes similar to those seen in rheumatic fever. The theory is advanced that these organ changes may be due to the presence in the pituitary extract of an adrenotropic hormone which liberates the D.C.A.-type of corticoid compounds from the animal's own adrenal.

In the light of these observations it would appear probable that the above-mentioned lesions, which we consider to be diseases of adaptation, are normally produced by means of the following mechanism: chronic exposure to stress causes the pituitary to produce an excess of an adrenotropic hormone which in turn stimulates the adrenal cortex to elaborate large quantities of D.C.A. (or pharmacologically related compounds). This hormonal reaction helps the organism to adapt itself to continued stress, but after some time it causes typical D.C.A. overdosage symptoms, namely nephrosclerosis, periarteritis nodosa and the cardiac lesions described above.

The author is greatly indebted to the Josiah Macy Jr. Foundation for subsidizing this work and to the DesBergers-Bismol laboratories who supplied the pituitary material. Special thanks are also due to Mr. Kai Nielsen for technical assistance in the microphotographic work.

REFERENCES

1. SELYE, H.: *Canad. M. Ass. J.*, 1942, 47: 515.
2. SELYE, H. AND PENTZ, E. I.: *Canad. M. Ass. J.*, 1943, 49: 264.
3. SELYE, H., SYLVESTER, O., HALL, C. E. AND LEBLOND, C. P.: *J. Am. M. Ass.*, 1944, 124: 201.
4. SELYE, H.: *G. M. Piersol's Cyclopedia of Medicine*, F. A. Davis Co. Publ., Philadelphia, 1940, 15: 15.
5. SELYE, H.: *J. Urol.*, 1941, 46: 110.
6. *Idem*: *J. Endocrinol.*, 1939, 1: 208.
7. *Idem*: *Encyclopedia of Endocrinology*, A. W. T. Franks Publishing Company, Montreal, 1943. Section I. Classified index of the steroid hormones and related compounds, 4 vols.
8. ALBERT, S.: *Proc. Soc. Exper. Biol. & Med.*, 1942, 51: 212.
9. ALBRIGHT, F.: *Harvey Lectures*, 1942-43, 38: 123.

FETAL ENDOCARDITIS

(Report of a Case)

By R. R. MacGregor, M.D., F.R.C.P.

Professor of Pædiatrics, Queen's University,
and

Ralph McKendry, M.D.

Department of Pathology, Queen's University,
Kingston, Ont.

A male infant was delivered by Cæsarean section on February 12, 1943, at the Kingston General Hospital. The mother wished to be delivered in that manner rather than risk delivery through the normal passages. Her previous child died of intracranial hæmorrhage following a difficult labour and her first pregnancy terminated by spontaneous abortion.

The baby cried at birth. Its weight was 7 pounds, 6 ounces. Three hours after delivery it was noted that the skin was blue and "blotchy". During the next 24 hours the temperature and pulse rate began to rise and there was no improvement in colour, so the infant was transferred to the Children's Hospital. Thereafter the temperature ranged between 99 and 101° F., with the exception of a drop below normal just before death on the 15th day. Respirations were approximately 80 per minute and the pulse rate was always very fast, about 180 per minute. The child remained deeply cyanosed throughout its existence. The colour was not improved appreciably by the administration of oxygen in an oxygen tent at the rate of 6 litres per hour. The cyanosis deepened when the baby cried. It was found necessary to use artificial means to keep the child warm.

Physical examination and roentgenograms of the chest taken on the 8th day showed that the lungs were aerated and that the heart outline was normal. The heart sounds were described as "running together" and there was a hum heard on the back between the scapulae. An electrocardiogram was taken and reported as being normal. The radial pulse could not be felt at any time.

Blood examination: 7th day, hæmoglobin 14.5 gm., red blood cells 4,590,000, white blood cells 20,300; 12th day, hæmoglobin 16.2 gm., red blood cells, 5,290,000, white blood cells 12,900. Differential count showed neutrophils 57%; lymphocytes 40%; and monocytes 3%.

The rising hæmoglobin and red blood count would indicate the development of a compensatory polycythæmia although the expected physiological decrease in leucocytes was taking place. In spite of all measures taken, including blood transfusions, the patient expired on February 26, 1943, and the body was submitted for autopsy.

Gross pathological findings.—The body was that of a well developed, rather well nourished male infant weighing 3,350 gm. The skin was markedly cyanotic. There

was an excess of blood-stained fluid in both pleural cavities and in the pericardial sac. The right lung weighed 56 gm. and the left 47 gm. Both lungs were firm, purple in colour, and sank in water.

The only other features of interest were in the heart and great vessels (Fig. 1). The heart weighed 31 gm. The right ventricle was slightly larger than the left so that the tip of the right ventricle formed the apex. The wall of the left ventricle measured 1.0 cm. in thickness, the right 0.8 cm. In the heart of an infant these figures represent thickening of the wall, particularly on the right side. Beneath the endocardial surface of the left ventricle there was a layer of firm white tissue from 1 to 2 mm. in thickness. There was blood clot adherent to the endocardium of the left ventricle near the apex.

The large arteries were in their normal positions but they showed considerable disparity in size. Arising from the enlarged and hypertrophied right ventricle the pulmonary artery passed upward as the largest of the great vessels, being 1.0 cm. in diameter. It gave off its right and left branches to the lungs and continued slightly diminished in size (0.9 cm.) as the ductus arteriosus. The aorta was absolutely and relatively small, measuring not more than 0.6 cm. in its greatest diameter in the ascending part or arch before it joined the ductus. The aortic valve ring was about 0.4 cm. in diameter and the orifice was further narrowed by thrombus formation on the thickened cusps and on the ventricular wall just below. There was another point of narrowing to a diameter of 0.4 cm. just proximal to the origin of the vessels to the head. Beyond that point the aorta joined the large ductus which appeared to be continuous with the descending aorta which was 0.9 cm. in diameter. The foramen ovale admitted only the tip of a probe and was effectively closed by flaps of tissue on either side. The ventricular septum was entire.

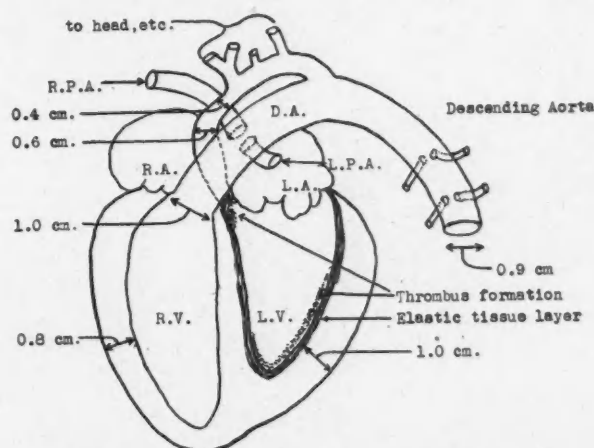


Fig. 1.—Diagrammatic sketch showing relations of great vessels.

Microscopic findings.—The most striking feature on microscopic examination was the unusual thickness of the endocardium of the left auricle and ventricle as contrasted with the normal thin endocardium of the right side of the heart. By Weigert's elastic tissue stain it was demonstrated that the white layer described grossly was composed of fibroelastic tissue containing very few blood vessels and only scattered connective tissue nuclei (Fig. 3). The aortic valve cusps which showed nodular thickening were largely made up of young fibroblasts loosely arranged parallel to the surfaces and in whorls in the deeper parts (Fig. 4). The considerable elastic tissue in the valves was continuous with the elastic tissue of the aorta and thickened endocardium. Adherent thrombi present on the valves and in the region of the apex showed numerous fibroblasts and young blood vessels indicating that they were not agonal formations. There were collections of small round cells and areas of calcareous change in the vegetations. The endocardium underlying the adherent thrombi was noted to

contain fewer elastic fibres than the adjacent tissues (Fig. 3). There were small patches of scarring with fibrous tissue replacement and calcium deposition in the myocardium just beneath the endocardium.

DISCUSSION

The nature of the vegetations and the thickening of the aortic cusps suggest fetal endocarditis. Similar lesions in an adult heart would certainly be attributed to an inflammatory pro-



Fig. 2.—Photograph of anterior aspect of heart. Note large thick-walled right ventricle and the enlarged pulmonary artery which continues as the ductus arteriosus to join the comparatively small aorta.

Fig. 3.—Photomicrograph of endocardium at the apex of the left ventricle. Note the greatly thickened layer of fibro-elastic tissue and the thrombus adherent to the surface. (Weigert's elastic tissue stain.)

Fig. 4.—Photomicrograph of aortic valve cusp. Thickened leaflet is seen in upper right, vegetation showing dark areas of calcium deposit in upper left. The hyperplastic elastic tissue of the endocardium of the left ventricle (lower left) is seen to be continuous with the elastic tissue of the valve cusp and aorta. (Weigert's elastic tissue stain.)

cess. Most of the associated anomalies can be explained on the basis of adaptive or compensatory changes. Failure of the left ventricle to deliver adequate blood imposed strain on the right heart which resulted in the large right ventricle and pulmonary artery and persistent ductus arteriosus. Explaining the association of the endocardial "elastosis" with 70%¹ of cases of fetal endocarditis has given rise to many theories, but there is still no satisfactory explanation. A favoured suggestion is that it results from dilatation of a heart chamber with overstretching of the endocardium. However, in this case the endocardial thickening was found in the left chambers (which were only inadequately filled) and was lacking in the right side where there was increased strain and some dilatation. Weinberg and Himelfarb² recently reported two cases of "endocardial fibro-elastosis" occurring in siblings. This together with the fact that the elastic tissue hyperplasia is usually uniform and confined to the left auricle and ventricle lends support to the idea that the cause is an inherent developmental defect.

Dr. Maude Abbott³ believed that a small proportion of cardiac anomalies resulted from fetal disease and that the absence of such developmental defects as patent septa indicated that the infection or intoxication causing the inflammation occurred relatively late in pregnancy, *i.e.*, after the heart was embryologically complete.

In a review of the literature up to 1940 Gross⁴ fails to find convincing evidence for an inflammatory genesis and concludes his study with the statement that "the occurrence of fetal endocarditis has never been established".

One argument advanced against the endocarditis concept is the absence of a maternal illness indicating infection during the puerperium. However Elliott⁵ has pointed out that transient symptomless bacteraemia may occur in as common a condition as oral sepsis. The argument that an acute form of fetal heart disease has never been encountered is important only if one insists that the inflammation must have an acute phase. The absence of a pathogenic organism does not disprove the inflammatory nature of "fetal endocarditis" any more than it does in the case of a rheumatic heart disease.

SUMMARY

This is the report of a case of a cyanotic male infant, dying after 15 days, which showed marked stenosis of the aortic valve, unusual hyperplasia of the endocardial elastic tissue of

the left auricle and ventricle and adherent thrombi about the aortic cusps and the apical region of the left ventricle. There was resultant hypoplasia of the ascending aorta and arch, a large patent ductus arteriosus and hypertrophy of both ventricles. The foramen ovale was effectively closed and the interventricular septum entire.

The primary condition is considered to be inflammatory in this case. There is a brief review of certain arguments in the prevailing controversy regarding the usual nature of "fetal endocarditis".

REFERENCES

1. GROSS, P.: *Arch. Path.*, 1941, 31: 163.
2. WEINBERG AND HIMELFARB, A. J.: *Bull. Johns Hopkins Hosp.*, 1943, 72: 299.
3. ABBOTT, M. E.: *Atlas of Congenital Heart Disease*, Am. Heart Ass., New York, 1936.
4. ELLIOTT, S. D.: *Proc. Roy Soc. Med.*, 1939, 32: 747.

A METHOD OF FIXATION IN FRACTURES INVOLVING THE MAXILLARY ANTRUM*

By Ernest E. Scharfe, M.D.

Montreal

THIS short presentation will deal with those fractures of the malar-zygomatic compound which involve only the maxillary antrum and orbit. The method which I am going to describe is not practical if the fracture involves the alveolus, as an intact alveolus is necessary for support.

The literature contains many descriptions of methods of reduction and fixation in these fractures and it would appear almost superfluous to add to them. I will not attempt to criticize the other methods described, as many of them are excellent. The simplicity of the appliance which I am going to describe is my only excuse for mentioning it.

Although the body of the malar bone is quite strong and is not frequently fractured, its processes and also the bones with which they articulate are rather frail and fracture easily. These fractures are the result of direct violence. Depending on the direction in which the force is applied, the body of the malar bone is frequently displaced either into the cavity of the

antrum or in a more upward direction into the orbit. This usually results in comminution of the walls of the antrum and floor of the orbit. In the cases in which the malar bone is displaced into the orbit there is frequently a quite firm impaction at the zygomatico-frontal suture which may require open reduction. In the cases in which the malar bone is displaced into the antrum, if there is much comminution of the walls of the antrum, it is not difficult to reduce the fracture, but it is frequently difficult to hold it in its proper position.

SIGNS AND SYMPTOMS

(1) Obvious depression of the outer part of orbit and flattening of the face. This may not be very noticeable after swelling becomes marked. (2) Unilateral epistaxis. (3) Subconjunctival hæmorrhage. (4) Ecchymosis of eyelids. (5) Anæsthesia of that part of the face supplied by the infra-orbital nerve. (6) Diplopia. This may be due to displacement of

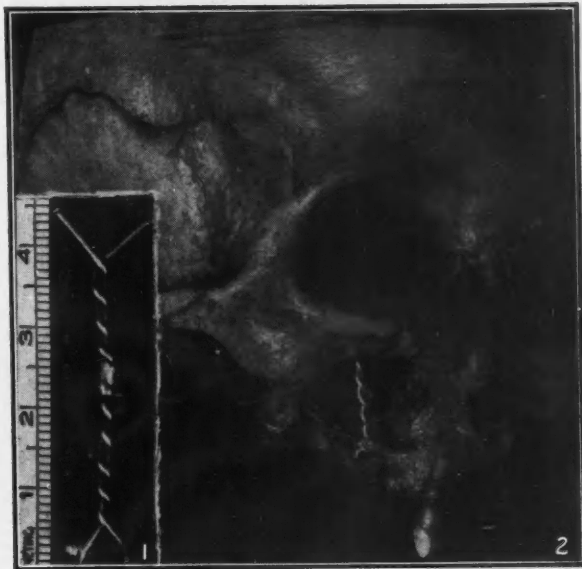


Fig. 1.—Wire splint which can be cut down to required length at time of operation. Fig. 2.—Specimen to demonstrate the splint in position. The opening shown in the anterior wall of antrum is, of course, much larger than need be made in a patient.

the eyeball or injury to the eye muscles, or both. (7) Interference with movements of the mandible due to pressure on the coronoid process. In the cases which I have so far treated I have not noticed this disability.

Diplopia, when present, is the most distressing and disabling complication of these fractures and, if present, is a definite indication for reduction. Disappearance of diplopia follow-

* From the Department of Otolaryngology, Montreal General Hospital.

Presented at the meeting of the Section of Otolaryngology, Montreal Medico-Chirurgical Society, December 15, 1943.

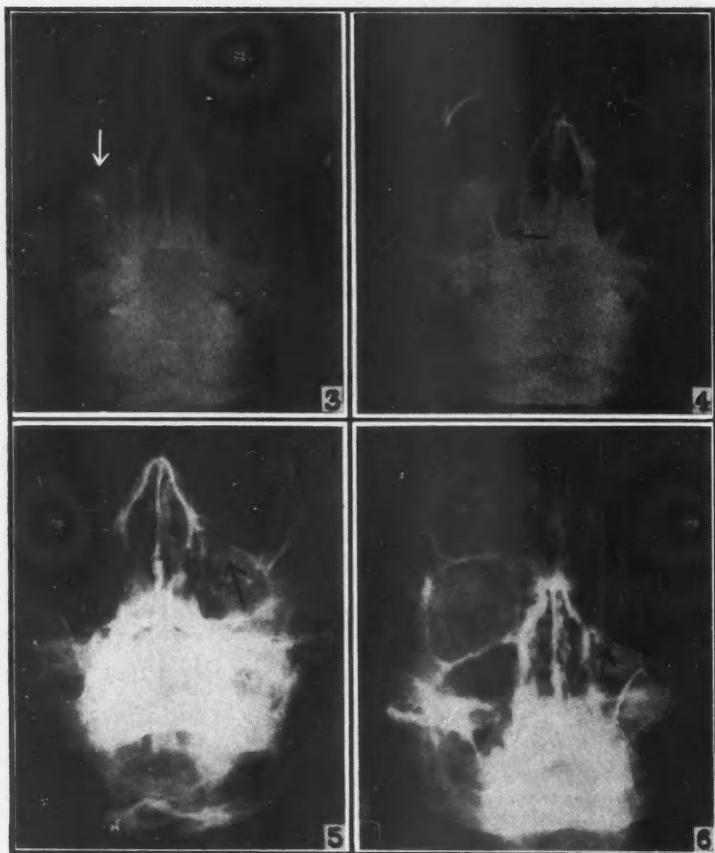


Fig. 3. (Case 1).—Fracture of right malar bone before treatment. The upper arrow points to depressed fracture of infra-orbital ridge, lower arrow to fracture of zygomatic arch. Fig. 4. (Case 1).—Same case following reduction and insertion of wire splint into anterior antral wall. The comminution of the anterior antral wall was not very marked in this case and a relatively short splint was used. The arrow points to splint in position. Fig. 5. (Case 2).—Before treatment. The arrow points to site of fracture of infra-orbital ridge with downward displacement of the malar. Fig. 6. (Case 2).—After operation with wire splint in position. The arrow points to site of fracture which now shows good reduction.

ing reduction is also a good indication of the efficacy of the treatment.

DIAGNOSIS

Inspection shows the typical deformity. Palpation reveals irregularity of the infra-orbital ridge and possibly at the zygomatico-frontal articulation. X-ray shows (a) separation of the zygomatico-frontal articulation; (b) depression of the outer part of the infra-orbital ridge; (c) cloudiness of the antrum, which may be due to blood or infection.

METHODS OF REDUCTION

The methods of reduction are too numerous to describe in this short presentation, but a few of them will be mentioned in the short bibliography to follow. Reduction may be obtained by most methods described, but in my

experience with a small series of these cases in which comminution was quite marked, good position will not be maintained unless some good means of fixation is employed.

METHODS OF FIXATION

(1) *Packing the antrum*.—This will hold the comminuted fragments in position, but I have always found it difficult to pack tightly enough to keep the body of the malar bone elevated. There is also danger of interference with the eye by too much pressure on the comminuted floor of the orbit. This method also entails keeping the antrum packed for at least one to two weeks and it does not seem possible that this can be done without considerable damage to the antral mucosa, especially the cilia. (2) External wire extension from a bar attached to a plaster head band. (3) Buried wire-sutures, as recommended by Lt.-Col. Stuart G. Gordon. (4) Fixation of the malar bone to the teeth by a metal splint, as described by Dr. Hamilton Baxter. (5) The method which I am going to describe, which consists of a small wire splint placed in the anterior bony wall of the antrum after making an opening in the canine fossa.

In fractures in which the cavity of the antrum is encroached upon, the walls are comminuted and the antrum contains blood clot, I feel it is wiser to treat these fractures through the antrum. Incision is made in the canine fossa as for a radical antrotomy. The fracture line or fractured area on the anterior wall of the antrum is exposed. Sufficient fragments are removed to give an adequate view of the cavity of the antrum. Blood clot is removed and an antrostomy opening is made into the inferior meatus of the nose. The malar bone may now be elevated and held in position by a wire-splint as shown in Figs. 1 and 2.

This splint (Fig. 1) consists of a piece of 18-gauge stainless steel wire twisted double, so that the ends are Y-shaped. A drop of solder may be put in the centre of this, to hold it solid and prevent unravelling. This splint should be made about $1\frac{1}{2}$ to 2 inches long and cut to required length at the time of operation.

The lower end of this is placed in a small V-shaped depression which should be made in the bone of the anterior wall just above the alveolus, and the upper end is anchored in a similar manner under the malar bone, as in Fig. 2. The splint may be placed in a vertical plane or more diagonally, depending on the direction of the displacement.

The position of the fragments should be checked by x-ray the following day and also the eyes should be examined to see if diplopia is corrected. In three weeks the splint is removed by reopening the incision under local anaesthesia. It is advisable to support the malar bone by inserting an elevator into the antrum while the splint is being removed, as union is not as yet solid. In one of my cases diplopia recurred to a mild degree after the splint was removed.

While the splint is in position the antrum may be lavaged or suction applied through the antrostomy opening if deemed necessary. None of the cases I treated showed evidence of antral infection at the time of operation, and the only post-operative treatment employed was passing a small metal suction tip through the antrostomy opening in the nose and aspirating any secretion in the antrum. This was done every three or four days. The patient did not complain of much discomfort, and, so far I have seen no ill effects followed this method of treatment.

I employed this method of treatment in a small series of cases while I was attached to No. 14 Canadian General Hospital in England, and have used it on one case since my return.

Roentgenograms of two cases are presented to show the splint in position.

CASE 1

Right malar fracture with involvement of right antrum. Patient had anaesthesia of the right side of the face and marked diplopia. Treated about three days after injury by reduction through the antrum and insertion of wire splint (Figs. 3 and 4). Diplopia disappeared immediately following operation.

CASE 2

These roentgenograms (Figs. 5 and 6) were sent to me by Major G. McBroom, of No. 14 Canadian General Hospital, to demonstrate a malar fracture with quite marked displacement. This case was treated by Major McBroom with apparently a very good result.

BIBLIOGRAPHY

1. GILLIES, H. D., KILNER, T. P. AND STONE, D.: Fractures of the malar-zygomatic compound with a description of a new x-ray position, *Brit. J. Surg.*, 1927, 14: 651.
2. STRAITH, C. L.: Management of facial injuries caused by motor accidents, *J. Am. M. Ass.*, 1937, 108: 101.
3. GORDON, LT.-COL. S. D.: Wire-suturing in the treatment of facial fractures, *Canad. M. Ass. J.*, 1943, 48: 406.
4. BAXTER, H.: A new method of treatment of depressed fractures of the zygomatic bone, *Canad. M. Ass. J.*, 1941, 44: 5.

1414 Drummond Street.

A RARE OVARIAN TUMOUR

(Brenner Type or Adenoacanthoma?)

By J. C. Simpson, M.D., C.M., F.A.C.S. and
Arnold Branch, M.D.*

Saint John, N.B.

THE following case is of interest as illustrating an uncommon ovarian tumour the exact diagnosis of which is still unsettled. The majority of the members of the Committee of the Ovarian Tumour Registry¹ considered it a Brenner tumour, and thus benign, a view also shared by Colonel Ash² of the Tumour Registry, while the minority favoured a diagnosis of adenoacanthoma, a tumour which possesses at least potential malignancy. The surgeon was thus left by the pathologist to make his own decision, and followed the conservative course by not performing total hysterectomy.

CASE REPORT

A Canadian housewife, 33 years of age was admitted to hospital on November 29, 1942, complaining of dyspareunia, a dragging pain in the lower right abdomen, backache and excessive menstruation of 10 days' duration occurring every 14 to 18 days. The dyspareunia had been present for the whole of her ten years of married life and had become worse lately. Eight years ago she was treated for what was called gonorrhœa. Five years ago she was told she had had an abortion but received no surgical treatment. Since then she had had more dyspareunia, increased flow, backache, and a dragging pain in the right lower abdomen.

Nothing of importance was elicited on enquiry into her past and family histories. She is happily married but has had no children and is anxious to have a child.

Physical examination.—The patient was a slight brunette, of good gait, posture, and intelligence, 5 feet 6½ inches tall, weighing 105 pounds, well nourished and had lost no weight in the last five years. The pulse rate was 80, the temperature 98.2°; respiration 20; and the blood pressure, 127/86. The red blood cell count was 4,100,000; the white blood cells 6,400; and the hæmoglobin 80%. The chest was radiologically negative, the abdomen slightly

* From the Prince County Hospital, Summerside, P.E.I., and the Bureau of Laboratories, Province of New Brunswick, Saint John, N.B.

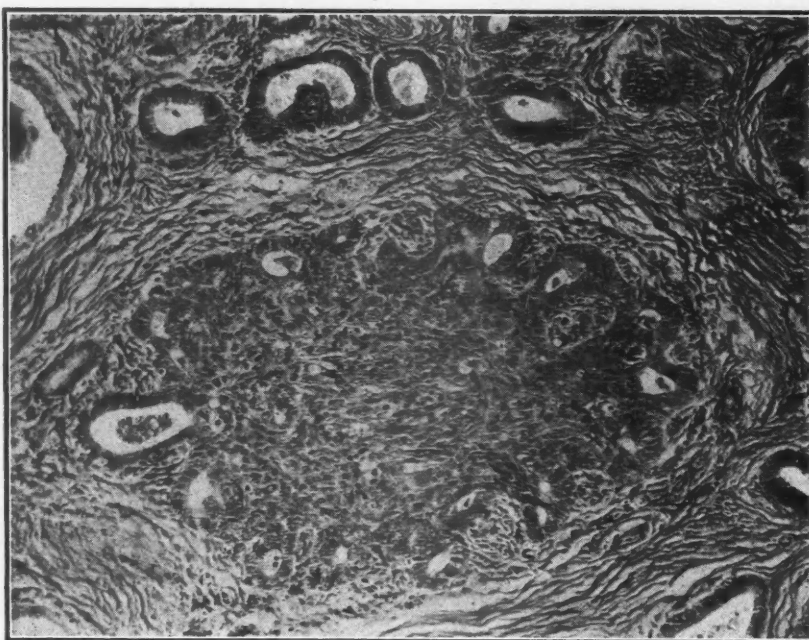


Fig. 1.—Microphotograph of ovarian tumour stained with hæmatoxylin and eosin.

tender in the right lower quadrant, and the reflexes were normal.

The external genitalia were normal, there was no vaginal tenderness or discharge, the cervix was long and healthy, the uterus was retroflexed and retroverted, moderately fixed and tender on movement. A hard spherical mass the size of a robin's egg was palpated in the region of the right ovary. This was felt better on rectal examination. The examination of the urine was negative.

Operation was advised and on December 2 the abdomen was opened under gas-ether anaesthesia, and examination revealed the following: the uterus was of normal size; there was a moderately large hydrosalpinx on the left side attached to the colon and a larger hydrosalpinx on the right, with a dense, hard oval mass low down in the right broad ligament the size of a robin's egg. The left tube was removed as well as the right hydrosalpinx and the mass described above. This stony hard mass was an ovary displaced laterally and downwards by the hydrosalpinx. The post-operative course was uneventful and the patient was discharged on the 12th day.

Subsequent history.—Six months later the patient was well, had gained six pounds in weight, was free from pain and backache, and her menses were regular every 28 days, lasting 3 to 4 days. She was able to have normal

pleasurable intercourse which she had not before experienced in ten years of married life.

Pathological report.—Grossly, after formalin fixation, the ovary was a firm, pale, slightly nodular encapsulated, oval mass 2.7 cm. in diameter. On section it resembled a fibroid with a small area of necrosis in the centre. There were no cystic spaces seen. Microscopically the tumour was composed of a dense fibrous stroma in which were scattered glandular spaces the majority of which were filled or partially filled by epithelial masses resembling squamous epithelium. The picture did not appear to be characteristic of the typical Brenner tumour, in

which the squamous epithelial masses rest on a condensed layer of stroma. In this instance, as illustrated in the microphotograph, the basal layer of epithelium appeared glandular in type, both in those acini not filled with squamous epithelium and also in those containing the squamous type of epithelium.

DISCUSSION

The Brenner tumour of the ovary is a benign solid tumour, usually unilateral and occurring most often after the menopause, and does not give rise to symptoms associated with endocrine disturbance. It is relatively uncommon, although Dockerty,³ of the Mayo Clinic, in 1940 reported 10 cases of his own and in a personal communication mentioned that he has seen one case which underwent malignant change to an epithelioma without any glandular epithelial elements being present. The adenoacanthomas as far as is known only occur in the uterus and form about 5% of the cancers of the body of this organ. They are formed of glandular epithelium undergoing squamous metaplasia and are of varying degrees of malignancy, but tend to spread to the adnexa, including the ovaries, although Novak⁴ does not mention adenoacanthomas of the ovary in his book on Gynaecological Pathology. Meigs⁵ in his book "Tumours of the Female Pelvic Organs" refers to 2 cases of adenoacanthoma of the uterus (in the eleven cited) as metasta-

sizing to the ovary; in one case this was bilateral and the other unilateral. Dockerty⁶ states that he has seen three cases in the ovary. One with bilateral small carcinomas of this type had had a previous hysterectomy for endometriosis.

It would be interesting to show that adenoacanthomas of the ovary could occur from an endometriosis by demonstrating the transition but this has not been possible in this case. No curettage was performed as the patient became symptomless after the involved ovary and tubes were removed. Could this tumour be a primary adenoacanthoma of the ovary?

The patient is being carefully observed with a view to attempting to settle the exact pathological diagnosis, and, if it be an adenoacanthoma, the question of the origin of the tumour as (1) primary in the ovary or (2) secondary to an endometriosis or an adenoacanthoma of the uterus. We are inclined to favour the diagnosis of adenoacanthoma.

We should like to express our thanks to Dr. Emil Novak, of Baltimore, to Dr. T. R. Waugh, of Montreal, and Dr. M. B. Dockerty, of Rochester, for their interest and help in the pathological study of this case.

REFERENCES

1. NOVAK, E.: Personal communication.
2. ASH, J. E.: Personal communication.
3. DOCKERTY, M. B.: *Proc. Mayo Clinic*, 1940, 15: 229.
4. NOVAK, E.: *Gynaecological and Obstetrical Pathology*, W. B. Saunders, Phila. & London, 1941.
5. MEIGS, J. V.: *Tumours of the Female Pelvic Organs*, Macmillan Co., N.Y., 1934.
6. DOCKERTY, M. B.: Personal communication.

LEIOMYOMA OF THE URETHRA (FEMALE)*

By Captain Max Ratner, R.C.A.M.C. and
Alex Strasberg, M.D.

A REVIEW of the literature on the female urethra has revealed two points: first, that tumours of the female urethra are relatively rare, and secondly, that not a single case of leiomyoma of the female urethra has been reported. Having encountered such a lesion we think it worthy of record.

One can appreciate the relative rarity of tumours of the female urethra when one considers that only four or five cases of urethral carcinomata, the most common type of neoplasm, are reported annually in the literature. Leiomyomata are benign smooth muscle tu-

mours. They are not uncommon as a type of growth. They may occur singly or in multiple numbers. The most prevalent form is the uterine fibroid. In the genito-urinary tract, this type of tumour is generally found in the kidneys and less often in the bladder, prostate, ureters and testes. It may occur wherever smooth muscle is present. It is present in two types (1) leiomyoma, composed of smooth muscle tissue, and (2) rhabdomyoma consisting of striated muscle fibres. The malignant form of these mesothelial tumours is the sarcoma.

ETIOLOGY

Ewing, in discussing fibroids, states that the essential factor is an embryonic disturbance. The relation of certain early myomas to blood vessels of the uterus has long been noticed, and it has been suggested that these myomas develop from disturbance in the growth of the blood vessels from whose walls the uterus and

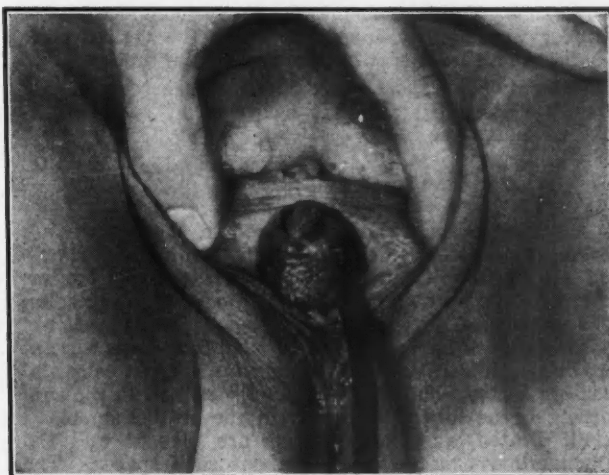


Fig. 1.—Catheter in urethra.

vagina originally receive their muscular tissue. On account of the histological nature of the urethra one may meet with epitheliomata and papillomata of mucous membrane origin. One may encounter a fibroma, that is, a connective-tissue tumour.

Another tumour very rarely seen may be an adenocarcinoma arising from Skene's glands or the glands of Littre. A mixed tumour occasionally seen is composed of connective tissue and epithelial elements.

Symptomatology.—The most predominant symptom in tumours of the urethra is hæmaturia. This may be either as an irregular bloody discharge, or it is associated with urination. There is difficulty in urination, amount-

* From the Department of Urology, Jewish General Hospital, Montreal.

ing sometimes to complete retention. The patient may complain of a "lump in the passage". It must be differentiated from carcinoma. The need for second sections is emphasized by Watson because of the frequent errors in diagnosis.

CASE REPORT

G.E., a female, aged 38, was admitted to the Jewish General Hospital, complaining of a large swelling in the urinary passage. She first noticed it ten weeks before, when voiding was attended with some bright staining. No other urinary symptoms were noted. Physical examination was essentially negative.

There was a large solid pinkish growth attached to the roof of the urethra. There was an area of ulceration on the surface and it was not tender nor did it bleed easily.

Urine analysis: albumen faint trace, no sugar; microscopically 3 to 4 red blood cells per field.

Blood count: erythrocytes 4,300,000; leucocytes 8,000; Hgb., 82%. Kline test, negative.

Under gas and oxygen a growth the size of an almond attached by a pedicle to the roof of the urethra very close to the vesical neck was excised.

Cystoscopy.—Eight days later cystoscopy was easily performed. The instrument was easily introduced. The bladder was slightly congested about the vesical neck. There was a recent scar on the roof of the urethra.

Pathological report.—Gross: Specimen consists of tumour mass and stalk partly covered by smooth grey mucous membrane.

PATHOLOGY

A section through the tumour nodule, shows a surface covered by a rather thick layer of non-keratinized stratified squamous epithelium. Slight parakeratosis has occurred on the surface of the epithelium. The epithelial cells are perfectly regular and basement membranes are well defined. Underneath the epithelium there is a scant but diffuse infiltration by lymphocytes, plasma cells and occasional polymorphonuclear leukocytes, and in the supporting tissue directly underneath the epithelium many small, dilated, vascular channels are present and the inflammatory exudate extends about such spaces. The rest of the section is made up of a well circumscribed tumour nodule which is composed of spindle-shaped cells which resemble those of smooth muscle. The cells form whorls and bands which interlace with each other. The nuclei are quite regular in appearance and there is no evidence of any malignant tendency. In some situations these fusiform cells tend to group themselves in concentric whorls around dilated blood vessels. When stained by the van Gieson method the tumour fails to show any form of collagen and stains uniformly yellow. Section through the stalk of the tumour shows a surface of stratified squamous epithelium which becomes continuous with transitional epithelium. The transitional epithelium forms deep crypts in the supporting tissue, giving the appearance of glands on section. Around such crypts and in the supporting tissue is a diffuse infiltration by lymphocytes, plasma cells and occasional polymorphonuclear leukocytes.

REFERENCES

1. GRAUER, T. P.: Leiomyoma, *J. Urol.*, 1938, 40: 594.
2. WATSON, E. M.: Carcinoma of the female urethra, *J. Urol.*, 1936, 35: 654.
3. EWING, J.: *Neoplastic Diseases*, Saunders, Phila., 1928.

THE TOXIC EFFECTS OF SULFONAMIDE THERAPY UPON THE URINARY TRACT*

By Major David Swartz, R.C.A.M.C.

IN recent years several new members of the sulfonamide group have established themselves as valuable chemo-therapeutic agents. While each successive member seemed to possess advantages over its predecessor it was not long in use before its toxic effects were observed. This paper will limit itself to a discussion of four of the most commonly used sulfonamide derivatives—sulfanilamide, sulfapyridine, sulfathiazole and sulfadiazine. The latter, being a recent acquisition, enjoys greatest popularity.

The sulfonamides are rapidly excreted by the kidneys, partly in the free state and partly as the acetylated derivative which is therapeutically inactive. Acetylation takes place in the liver and presents considerable variation in different patients. The acetyl derivative is less soluble than the free drug and therefore more prone to crystallization.

The high solubility of sulfanilamide and the moderate solubility of its acetylated derivative tend to keep this drug in solution, although crystals are often observed in the cooled urine. This property of sulfanilamide leads to fewer renal complications. Hemolytic anemia which occasionally follows sulfanilamide therapy may produce tubular obstruction by the deposition of hemoglobin in the presence of acid urine much in the manner of a transfusion reaction kidney.

The other three drugs noted above are relatively insoluble in urine, particularly their acetylated derivatives.

All types of sulfonamide crystals have been identified by studying their optical properties under polarized light, and the polarizing microscope has been used for this purpose. The production of crystals depends upon several factors. (1) The solubility of the drug. (2) The degree of acetylation. (3) Concentration of the drug in the urine and blood.

Blood levels of 5 to 10 mgm. % are usually necessary to obtain useful effects. Many cases of crystalluria have been reported with a blood level of 7 mgm. % or under, whilst in other

* Read before the Winnipeg Medical Society, December 17, 1943.

cases with much higher blood levels renal complications did not ensue. This would indicate that other factors may be responsible.—

(4) The volume of fluid passing through the kidneys. (5) Renal function—lowered renal function through urinary stasis or other causes increases the risk of crystallization. (6) The temperature of urine. The presence of crystals in the urine during sulfonamide therapy is a frequent finding and of no significance. This is due to precipitation during the process of cooling. In a fresh specimen such a finding is more ominous. It is observed that in the majority of reported cases anuria followed a definite drop in temperature. (7) Urinary pH. These drugs and their acetyl derivatives are weak acids. As in the case of other weak acids their sodium salts are quite soluble. Salt formation is greatly increased at the higher range of urinary pH. At the usual range of 5.6 to 6.6 the drug is relatively soluble. At 7.5 its solubility is tripled and at 8 it is increased tenfold. (8) Individual sensitivity.

Why some develop crystalluria after receiving a small amount of the drug while others with much greater dosage will avoid this complication, all other factors being equal, can only be explained on the basis of sensitivity.

CLINICAL PICTURE

There are three progressive phases. In the first, hæmaturia is noted microscopically and is associated with crystals. Its detection is dependent upon frequent microscopic examinations of the urine. In the second phase hæmaturia is gross; there is pain in the lumbar region, first in one loin then in the opposite. The kidneys may enlarge slightly and become palpable and tender. There is oliguria, general malaise, pyrexia and vomiting.

Failure to produce diuresis within 12 hours leads to the third phase. This is an exaggeration of the second with anuria and a rising blood urea. This may prove fatal.

MORBID ANATOMY

There are two pathological types. Type 1.—A mechanical block is produced within the ureter by amalgamation and coalescence of crystals forming soft concretions. If this is bilateral it can give rise to anuria. Type 2.—There is precipitation within the convoluted and collecting tubules extending to the calyces and pelvis, giving rise to direct toxic effects upon the

renal epithelium. These toxic effects may occur with minimal or no precipitation. This type is often fatal. It is likely that type 1 is usually associated with some tubular precipitation.

A case has been reported by Pepper and Horack⁵ in which hæmaturia and oliguria occurred within the fourth day of treatment following a total dosage of 24 gm. The drug was stopped and within a week hæmaturia ceased, urinary secretion increased and the patient had apparently recovered. On the ninth day he died suddenly of a coronary occlusion. An autopsy showed that large areas of tubules of both kidneys were plugged by crystals and there were hæmorrhages throughout the pyramids and the mucosa of the pelvis.

In type 2 both kidneys are always involved. The kidneys are usually swollen and the capsule tense. The cut surface is pale, with linear vascular striations in the medullary region. The lining of the renal pelvis appears greyish red and congested. The pelvis, calyces and adjacent tubular portion contain a brown, gritty, crystalline material, although this finding is not constant.

The microscopic appearance is that of ulceration, intense inflammation and necrosis. The glomeruli appear somewhat acellular and show considerable thickening of the basement membrane. The glomerular spaces are dilated and contain a moderate amount of eosinophilic granular material. Many of the glomeruli are hyalinized. The tubules are dilated, may be filled with crystals or contain an eosinophilic granular material. There is diffuse polymorphonuclear and lymphocytic infiltration.

As a pathological entity this condition may be referred to as acute sulfonamide nephritis.

PREVENTION

Ascertain whether the patient has had previous sulfonamide medication. If in doubt, determine the presence of the drug in the urine or blood. Evaluate renal function before inauguration of treatment. With impaired renal function there is greater chance for overdosage; therefore do frequent urinalyses and blood estimations. The infectious state for which the drug is given may in itself produce renal changes with casts, red blood cells, albumen, etc. A careful preliminary study of the urine should enable one to interpret these findings. Significant hæmaturia is a definite indication to

discontinue the drug. Palpate for the kidneys before and during therapy. If tenderness or enlargement is noted discontinue the drug.

Evaluate hydration of the patient. A severely dehydrated patient is more likely to experience renal damage and should therefore be given smaller dosage. Chart the fluid intake and output. These should be comparable. Fluid intake for 24 hours should be at least 2,000 c.c. A decreasing fluid output calls for discontinuance of the drug. A urinary pH of at least 7.5 should be maintained during treatment. This may be accomplished by adequate dosage of soda bicarbonate. Idiosyncrasy to sulfonamides must be considered. Renal damage can occur with low blood levels or after a small amount of the drug has been administered. A false sense of security may be obtained by failure to appreciate this possibility. A preliminary blood picture should be noted and frequent leucocyte counts done during therapy.

TREATMENT

Once the slightest evidence of kidney damage presents itself stop the drug immediately. Obtain diuresis by forcing fluids. (a) By mouth. (b) By intravenous route. Five per cent glucose in saline is a safe diuretic. If there is no cyanosis and if oliguria persists after other measures for diuresis have failed magnesium sulphate may be given intravenously; mercury and acid diuretics should not be used. Administer soda bicarbonate by mouth. Poultice the lumbar regions.

In case of progressive oliguria or anuria, do a cystoscopic examination without delay. Catheterize both ureters and lavage the pelvis of both kidneys with warm normal saline or 2% soda bicarbonate solution. The catheters are permitted to remain *in situ* and lavage repeated every 2 hours for about 12 hours, or more often if it appears necessary. The catheters are removed in 24 to 48 hours. This procedure may not suffice. Such procedures as decapsulation and pyelotomy have been suggested but these are of doubtful value. An intense diuretic regimen must be depended upon.

There is usually no evidence of persistent renal damage after the condition is relieved but further time must elapse before the question of ultimate prognosis can be answered.

The following three cases are reported.

CASE 1

White male, aged 26, weight 120 pounds, undersized due to marked scoliosis to right. Right nephrectomy performed for calculus pyonephrosis. Left kidney normal. Because of fever and chills and some pus in urine, following nephrectomy, sulfathiazole was administered, 350 gr. over a period of 10 days. On the tenth day gross blood appeared in the urine; there was left loin pain and tenderness, diminished urinary output and in a matter of hours anuria. Cystoscopic examination revealed a crystalline plug at the left ureteric orifice. This could not be dislodged and ureteral catheterization was impossible. A left McBurney incision was made, the ureter exposed, incised, and a No. 12 rubber catheter inserted. This resulted in a steady stream of urine which had been under tension. Daily intravenous of 5% glucose in saline was given and soda bicarbonate by mouth, 120 grains per day. The catheter was removed in 10 days, with uneventful recovery.

CASE 2

White male, aged 22, suffering from V.D.G. Had received a course of sulfathiazole, 600 gr. over a period of 10 days; then a two-day rest interval followed by a course of sulfapyridine. On the third day of the second course in which he had received 160 gr. he developed hematuria, loin pain, oliguria, followed by anuria. Cystoscopic examination revealed crystalline plugs at the mouth of each ureter. These were dislodged with catheters which were passed up each ureter. There was a forcible stream of urine from each catheter. Pelves were irrigated with warmed normal saline solution every 2 hours for 12 hours. Intravenous glucose in saline was administered and catheters were removed in 36 hours with uneventful recovery.

CASE 3

White male, aged 53, suffering from "flu" received 24 gm. of sulfathiazole over a period of 4 days. He developed loin pain and diminished urinary output; although the drug was stopped anuria ensued within 6 days of initial administration. Non-protein nitrogen had risen to 83 mgm. %. He was perspiring profusely and vomiting. Cystoscopic examinations under spinal anaesthesia revealed a highly oedematous bladder with a small amount of mucous secretion. Both ureteral orifices were hemorrhagic and hidden by the bulging mucosa about them. A large amount of greyish-yellow crystalline material was noted in the vicinity of the orifices. Both ureters were catheterized with difficulty. The urine came through under pressure; on the right side it was bloody, on the left side clear. Both catheters were irrigated with warmed normal saline solution every 2 hours for 24 hours; 1,000 c.c. of 5% glucose in saline were given intravenously twice daily for 5 days, and heavy dosage of soda bicarbonate by mouth. About a week later he developed some pain in the left loin. Intravenous pyelogram revealed some slight dilatation of the left renal pelvis. This was interpreted as indicating that there might be some residual obstruction on this side. In another week, following further alkalization and free fluid intake this symptom disappeared. The patient was discharged from hospital as cured.

CONCLUSIONS

1. In the administration of sulfonamides the possibility of renal complications should always be kept in mind.
2. By proper care, and observance of certain general principles this complication can be avoided.

BIBLIOGRAPHY

1. FOX, L. JR., JENSEN, O. J. AND MUDGE, G. H.: Prevention of renal obstruction during sulfadiazine therapy, *J. Am. M. Ass.*, 1943, 121: 1147.
2. BRADFORD, H. A. AND SHAFFER, J. W.: Renal changes in a case of sulfadiazine anuria, *J. Am. M. Ass.*, 1942, 119: 315.
3. WINSOR, T. AND BIRCH, G. E.: Renal complications following sulfathiazole therapy, *J. Am. M. Ass.*, 1942, 118: 1346.
4. LAIRD, S. M.: Renal complications of sulfapyridine therapy, *The Lancet*, 1941, 2: 272.
5. PEPPER AND HORACK: Crystalline concretions in renal tubules following sulfathiazole therapy, *Am. J. M. Sc.*, 1940, 199: 674.
6. LINDNER, H. J. AND ATCHESON, D. W.: Sulfathiazole crystallization in the kidney, *J. Urol.*, 1942, 47: 262.
7. SATTERTHWAITE, R. W.: Sulfadiazine reactions, their frequency and treatment in urological cases, *J. Urol.*, 1943, 49: 302.
8. BARNES, R. W. AND KAWAICHI, G. K.: Factors influencing the formation of sulfonamide urinary concretions, *J. Urol.*, 1943, 49: 324.
9. JENSEN, O. J. AND FOX, C. L.: Hydrogen ion concentration and solubility of sulfonamides in urine, the relation to renal precipitation, *J. Urol.*, 1943, 49: 334.

No. 10 Co. R.C.A.M.C.,

PENTOTHAL SODIUM ANÆSTHESIA

By I. Rachmel, M.D.

Charlottetown, P.E.I.

MUCH has been written about pentothal sodium anæsthesia in the last few years. We would like on this occasion to give our opinion about this kind of intravenous anæsthesia from our own experience in the Prince Edward Island Hospital.

Pentothal sodium is a barbiturate which is given intravenously and is rapidly destroyed in the liver, so that its action, although being powerful, is not a prolonged one. In view of this fact the depth of anæsthesia can practically be maintained at the level desired by the anæsthetist as if he were using ether or gas.

The argument against intravenous anæsthesia is that once the substance is injected there is nothing that we can do to get it out. This argument is a valid one, but will only apply in the case where the anæsthetist is not experienced in giving this kind of anæsthetic and is not following the few rules to avoid complications arising from poor administration.

Pentothal has the advantage of being the easiest anæsthetic to give, at least to an adult patient; and it does not require much experience for the doctor to produce a good intravenous anæsthesia. From the patient's point of view it certainly is the most pleasant anæsthesia and very seldom are any after-effects present.

There are a few contraindications for pentothal, for instance liver diseases, because the anæsthetic is destroyed by the liver, jaundice, cases with marked dyspnœa, shock, respiratory obstruction, cardiac decompensation, hypotension or hypertension, sulfonamide-treated patients with marked cyanosis. These types of cases should be remembered as not being suitable for pentothal. If an accident should occur in one of them, the anæsthetist, rather than the anæsthetic, should be blamed.

The administration of pentothal is very simple. It is given in a 2.5 or 5% solution in 10 c.c. of thrice distilled water. Many advocate the 2.5% solution, the reason being that in a more dilute solution the anæsthesia is induced more slowly than with a 5% solution, and the chances for cyanosis and respiratory difficulties are much less. In the hospital we are using the 5% solution. By injecting the first 5 c.c. very slowly, in approximately two minutes, we have never had any trouble with our patients. Another reason is that 10 c.c. of a 2.5% solution is not enough to give complete anæsthesia for an adult, even for a small operation, so that syringes have to be changed during the operation, whereas with a 5% solution 10 c.c. is usually sufficient for an operation requiring a short time. It is true that a 20 c.c. syringe could be used for the weaker solution, but everybody will agree that it is quite an effort to try to get into a vein of a fat patient with a 20 c.c. syringe attached to a small needle.

The solution that we use is always freshly prepared, although under certain conditions it could be kept for forty-eight hours, provided it was kept away from light and air. The injection is started a few minutes before the operation, because it takes only a few minutes to put the patient to sleep. While the pentothal is being injected slowly the patient counts out loud, and after 5 to 6 c.c. of the 5% solution is injected he usually falls asleep. The onset of the unconscious condition is a very natural one. The patient feels sleepy, yawns, and in about 30 seconds goes to sleep soundly. About one minute later the beginning of muscular relaxation can be felt. The corneal reflexes have disappeared. A slight drop in blood pressure is noticed which soon goes back to normal. The respirations become shallow but normal in rate and rhythm per minute. If more pentothal is given very good muscular

relaxation can be obtained, in fact, sometimes as good as with a spinal anæsthetic. As soon as the patient is asleep the lower jaw drops, and, if not supported, the airway will be obstructed. That is why an assistant is always necessary to hold up the jaw. The cutaneous reflexes disappear. The pharyngeal reflex is present unless large doses are used and this is why pentothal is no good for a tonsillectomy. When big doses are used the danger point is not too far off, so that the anæsthetist should watch the patient closely, and by that we mean the respirations, because this is the first centre to be affected. The patient becomes cyanosed and soon breathing stops. Oxygen should be given immediately. Artificial respiration may be necessary and should be kept up until the patient breathes normally again. In one of our cases, a male adult, 22 years old on whom an appendectomy was performed, 1.5 gm. of pentothal was given (which we do not consider a big dose). Just before the end of the operation the patient stopped breathing. Artificial respiration with the administration of oxygen and 5% CO₂ was kept up for 45 minutes, after which the patient's recovery was a perfectly normal one.

If only small doses of pentothal are used the patient usually wakes up in 10 or 20 minutes, but will feel sleepy for an hour or two. The coming out of anæsthesia is perfectly normal, and seldom have we seen any vomiting headaches, retention of urine, or other complaints noticed in other kinds of anæsthesia.

It is often recommended not to use big doses of pentothal. This is a good rule for any kind of drug. In our experience in the Prince Edward Island Hospital we have noticed that with a little care quite large doses of pentothal can safely be given. Just for illustration purposes we will mention a few of our cases (Table I).

As can be seen, we have given quite large doses of pentothal without any toxic symptoms or fatal ending. The duration of the anæsthesia in many of our cases was quite a long one. One was for almost 3 hours. We would not recommend the use of pentothal for such long operations because of the difficulty to keep the anæsthesia at the required depth, and the risk of giving too much, especially if the anæsthetist has not had much experience with using pentothal; or if facilities for artificial respiration are not present. But it should be

TABLE I.

Age	Diagnosis	Operation	Time	Amount
1. 35	Retroverted uterus	Vaginal and abdominal	63 min.	2 gm.
2. 22	Compound fracture of jaw	Reduction of fracture	2 h. 50 min.	1 gm.
3. 26	Acute mastoiditis	Mastoidectomy	45 min.	1.5 gm.
4.		Amputation of leg	38 min.	1.5 gm.
5. 18	Acute appendicitis	Appendectomy	30 min.	1.5 gm.
6. 51	Varicose veins	Excision of veins	43 min.	2.5 gm.
7. 19	Retroversion of uterus, and salpingitis	Vaginal and abdominal	60 min.	2 gm.

remembered that this same difficulty, though to a lesser degree, can also be observed with any other anæsthetic.

The depth of anæsthesia does not depend only on the amount of pentothal given but also on the patient. We have noticed that age does not influence the amount necessary for anæsthesia, unless the patient is over 55 years or under 12 years. The weight of the patient seems to be an important factor. As a rule it is an individual reaction towards pentothal and it is impossible to say beforehand how much the patient will need.

We have used pentothal in a great variety of cases. With the exception of tonsillectomy and œsophagoscopy examination, pentothal anæsthesia has proved very satisfactory for the reason already mentioned.

Our experience in the only Cæsarean section that we had was not very satisfactory, for the reason that the baby was born with asphyxia, and there did not seem to be any other cause for it, so we did not use any more pentothal in Cæsarean operations.

The mortality due to pentothal is very low, and certainly not higher than with any other anæsthetic. Of our 906 cases from 1939 to June, 1943, we had one fatal case in which the death was most likely due to pentothal anæsthesia. Even in that case we are convinced that if the pentothal had been given properly, the fatal end could have been avoided. This case was a male baby 5 months old with a marked hare-lip and cleft palate. One gm. of pentothal in 300 c.c. of glucose saline was given intravenously. After receiving approximately 100 c.c. the baby fell asleep. Pulse and respira-

tion were checked continually and remained perfectly normal almost all the time. The baby got coramine as a respiratory stimulant twice during the operation. Just before the close of the operation respiration stopped. Artificial respiration was given for over an hour without results. During the operation the patient received approximately 150 c.c. of the 300 c.c. solution containing the 1 gm. of pentothal. The mistake that was made in this case seems to be a two-fold one. First, oxygen through a nasal catheter should have been given and this was not done. Second, the pentothal solution should have been stopped during the operation and pure glucose and saline given intravenously. This was not done. Although this case had a fatal ending we are convinced that by proper administration we would have had a better result. It certainly is a good way of giving an anæsthetic in cases of hare-lip or cleft-palate because the operating field is clear for the surgeon and the anæsthetist is not in his way. We had no other cases of this kind so that we

creased from 2% in 1939 to 33.8% in 1942 which meant 379 operations. In the first six months of 1943, 40% of our anæsthesias have been under pentothal, which meant 192 operations.

Table II shows the percentages of all the anæsthetics used in this hospital for the last 5½ years.

From the above figures it can be seen that the amount of cyclopropane, ether, chloroform and local anæsthetics has decreased in favour of pentothal. Although pentothal could not replace a spinal anæsthetic for an abdominal operation requiring a long time, it can replace almost any kind of anæsthesia for the majority of operations which do not require too much time. Oxygen should always be kept at hand in case of necessity.

Due to the safety with which it can be given, the easy administration, and the fact that there are seldom any complaints from the patients, we consider pentothal to be one of the best anæsthetics at the present time.

222 Queen Street.

TABLE II.

	1938	1939	1940	1941	1942	June 9 1943
No. of anæsthetics	747	899	882	965	1,120	478
Ether.....	42.57	42.38	41.50	38.76	37.23	23.01
Spinal.....	8.7	13.35	8.73	8.29	12.5	10.46
Cyclopropane	27.84	27.48	23.02	21.76	6.07	15.69
Pentothal....		2.0	14.06	18.96	33.84	40.17
Evipal.....	0.27	1.67				
Chloroform..	1.34	1.78	1.02	0.31	0.45	0.84
Local.....	19.28	11.35	11.68	12.92	10.80	9.83

have had no opportunity to use pentothal anæsthesia again for children of that age.

In war surgery pentothal seems to be one of the most favourable anæsthetics due to the facility with which it is given and to the fact that it does not require the doctor to carry many instruments. An important factor, also, is that it is not inflammable and for this reason it is safe to give when cauteries are used or examinations under the fluoroscope made, without requiring any special insulation of the room, whereas with gas or ether, even if it seldom occurs an explosion is always a possibility.

In the Prince Edward Island Hospital our results with pentothal anæsthesia have been very satisfactory and the use of it has in-

Case Reports

PRIMARY CARCINOMA OF THE UTERUS AND A PRIMARY CARCINOMA OF THE BREAST IN THE SAME INDIVIDUAL TWENTY-THREE YEARS LATER

By W. A. Lincoln, M.D., C.M.,
F.R.C.S.(Eng. & C)

Calgary, Alta.

This patient, aged 67, was first seen twenty-three years ago when she was sent in from the country with severe uterine hæmorrhage, which had been present for some months. Examination showed that the uterus extended half way to the umbilicus, containing a growth involving the whole uterus and cervix.

Biopsy showed carcinoma, and a panhysterectomy including the upper portion of the vagina was done. Pathological report showed that the whole uterine wall including the cervix was infiltrated with an alveolar carcinoma. No enlarged glands of the pelvis or abdomen were found. She made a good recovery.

The patient remained well until two months ago when she again presented herself with a

large movable, but painless, lump the size of a tennis ball, in the upper and outer quadrant of the left breast. The glands of the axilla were palpable. The general condition was good and there was no sign of growth in the pelvis, abdomen or liver. Radical amputation of the breast, muscles, and contents of the axilla was carried out. Pathological report showed a large acinous carcinoma of the breast extending into, but not through, the pectoral muscle. No carcinoma was found in the glands of the axilla. She made a good recovery.

This case presents two points of interest:

1. The successful removal of a carcinoma involving the whole uterus and cervix with no recurrence after twenty-three years.
2. The development of a primary growth in the breast of the same individual twenty-three years later.

AN UNUSUAL PELVIC FRACTURE

By Capt. J. E. Musgrove

Winnipeg

Private C.D.K., was a 40-year old man doing a sedentary type of work. He had been in good health until October 29, 1943, when he slipped on the icy street and "did the splits". His right leg slipped laterally and slightly posteriorly and he landed with most of his weight on his left buttock. He immediately felt a moderately severe pain, high in the adductor region of the right thigh. Walking aggravated the pain, and he walked with a considerable limp.

He was admitted to Fort Osborne Military Hospital the day of the accident. From his history and physical findings he was thought to have a strain of the right adductor longus muscle at its origin from the pubic bone. He was placed in bed and given hourly hot packs to this region.

On November 4, he was still complaining of moderately severe pain high on the inner side of his right thigh whenever he attempted an adduction movement. He localized this pain with his index finger, pointing, not to the origin of the adductor longus muscle from the pubic bone but to the region of union of the conjoined rami of the right pubes and ischium. He was quite tender on palpation at this site, both externally and internally per rectum. Stereoscopic roentgenograms of the pelvis (Fig. 1) were taken on November 5, revealing a fracture line across the right inferior pubic ramus, with two adjacent condensed lines, which were interpreted as buckling of the cortex.

The patient remained in bed one month. He could then walk with very little discomfort, but active adduction movements still caused pain at the previously localized site. He was discharged from hospital December 4, 1943, to carry on with his sedentary duties.

He was re-examined on January 5, 1944, 68 days following his accident. He stated that for the previous two weeks he had been entirely free of discomfort, even on forced adduction of his right thigh. There was a definite, slightly tender swelling at the site of the union of the conjoined rami of the right pubes and ischium. Roentgenograms taken at this time (Fig. 2) showed the fracture line traversing the right inferior pubic ramus, with considerable callus formation.

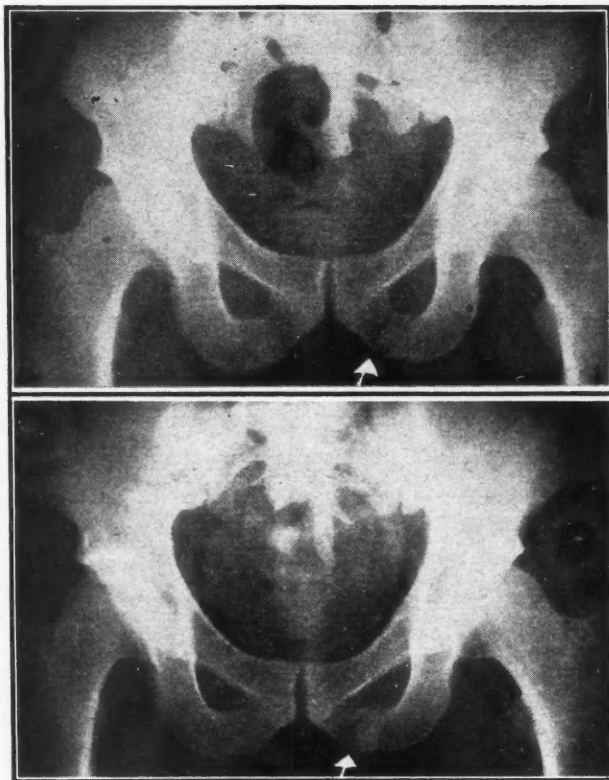


Fig. 1.—A fracture line across the right inferior pubic ramus, with two adjacent condensed lines, which were interpreted as buckling of the cortex.

Fig. 2.—Fracture line traversing the right inferior pubic ramus, with considerable callus formation.

DISCUSSION

This fracture is interesting for three reasons. Firstly, to my knowledge, this type of acute pelvic fracture has not been described in the literature. Secondly, the roentgenograms are almost identical with the march fractures of the inferior pubic ramus described by Nickerson,¹ and thirdly, the fracture in this instance was at first mistaken for a strain of the origin of the adductor longus muscle.

It is difficult to determine the mechanism of this fracture. However, on careful study of the anatomy of this region, it is seen that the chief muscle attachment to the conjoined pubic and ischial rami, lateral to the site of the fracture, is the origin of the powerful adductor magnus muscle. The proximal fibres of this muscle arise immediately lateral to the fracture and pass horizontally to be inserted into the femur. In applying this knowledge to the manner in which this fracture was produced, it is possible that the adductor magnus, particularly the proximal fibres, caused a traction fracture of the conjoined ramus of the pubes and ischium in attempting to break the fall when "doing the splits".

If this hypothesis is correct, similar repeated minimal strains, which a soldier is very liable to incur during training, may be the cause of the march fracture of the pubes described by Nickerson.¹

REFERENCE

1. NICKERSON, S. H.: March fracture or insufficiency fracture, *Am. J. Surg.*, 1943, 62: 154.

Fort Osborne,
Winnipeg.

Special Article

A SHORT HISTORY OF HEALTH INSURANCE IN CANADA

By H. E. MacDermot, M.D., F.R.C.P.(C)

Montreal

We have now reached a stage at which it should be worth while to review the part played by our Association in the development of health insurance in Canada. The survey will be in outline only, but full references to the sources will be given.

The beginnings of health insurance planning are found wherever improvement of social conditions has been attempted,* but in Canada the subject has only received attention during the past twenty-five years. So far as this Association is concerned, the first reference to health insurance was made in 1912,¹ and, as might be expected, was no more than a comment on the newly introduced Insurance Act of Great Britain. The editorial view of that Act (but not necessarily of health insurance as such) was rather cynical. Fear was expressed that it would inevitably lead to the public management and control of voluntary hospitals:

"When this state of affairs comes about, a spirit of charity will be replaced by a cold, official atmosphere. When physicians become civil servants, those who are peculiarly adapted for healing the sick will be automatically forced out of the service and into private practice. The rich will be the gainers and the last state of the poor will be worse than the first."

1914

In December, 1914, the first constructive ideas to appear on the matter were presented by Dr. A. R. Munroe, of Edmonton in the *Journal*.² He admitted that there was a need for better distribution of medical services, but his distrust of the political direction of this was clearly stated. He said:

* An excellent history of health insurance in general is contained in the Report of the Advisory Committee on Health Insurance, Ottawa, March, 1943.

1. *Canad. M. Ass. J.*, 1912, 3: 228.

2. *Ibid.*, 1914, 4: 1112.

"The free clinic and all similar institutions are made possible by exploiting the medical profession either in the name of charity or religion. In Great Britain, Mr. Lloyd George, in introducing the National Insurance Act, practically stated that the medical profession should not be so exploited and then went ahead and exploited it in the name of politics."

Dr. Munroe's suggestion was to study commercial methods of insurance and apply them when possible to medical practice. He laid down four points which he thought should be acceptable:

- "1. The services of the whole of the medical profession should be at the disposal of the whole public.
- "2. No one should be made the object of charity.
- "3. The average medical income should be increased.
- "4. The basis of reckoning from which the actuary obtained his rate of insurance to the public should be the medical schedule of fees.

"This is perhaps the largest problem that the younger generation of medical men will have to solve in their day and generation. It is worth every man's while studying."

1917

The next voice to be raised was that of Dr. A. D. Blackader in 1917, in his Presidential address to the Association.³ Dr. Blackader saw very clearly the demands which would be made on the profession by social and economic developments.

"Our profession must wake up to the fact that powerful influences are being exerted upon it from many quarters, and if it is to have the weight and influence in the public councils that it undoubtedly ought to have, it must speak early and clearly, and give its reasons and not delay until public opinion has crystallized into legal enactments. No other society or association of physicians in our Dominion can speak so authoritatively or so effectively as can this Association. In my opinion it is a duty which should not be shirked. But before we speak, conditions must be carefully considered."

And later on in reference to the Insurance Act of Great Britain,

"In England the physicians paid little attention to the measure, until prospective, or in some cases actual financial pressure led them to act, and then the opposition which they raised to many of its provisions led to a widespread impression that mercenary reasons, and not a just appreciation of the beneficent workings of the bill, influenced their action.

"Let us avoid such a possibility in Canada, and be prepared to consider the measure from every point of view, and perhaps even to further its advancement by our own action, for I feel assured that with broad and friendly consideration from the profession, the details of an insurance scheme can be arranged so as to secure entirely dignified terms for our members, and to accomplish mutual benefit for all parties. I would, therefore, urge this Association to appoint a strong committee which should include representatives from every province to give the matter their careful consideration, and to present a report upon all the important points to be taken to safeguard the true interests of our own profession."

These extracts show that even at a time when our organization was loose and the representa-

3. *Ibid.*, 1917, 7: 582.

tion of the profession in the Association comparatively insignificant, there still were men who foresaw the social changes which we now are undergoing and were anxious to plan ahead for them.

1919

The idea of State Medicine was not long in sprouting. In July, 1919, Prof. D. F. Harris read a paper before the Association of Medical Health Officers of Nova Scotia on "The Medical and Allied Professions as a State Service"⁴ in which he frankly advocated the medical profession being servants of the state in a public department similar in status and practice to the civil service. He contended that as preventive medicine was already a state department curative medicine should also be made the concern of the state.

"It is an anomaly that if your child has scarlet fever, while one aspect of the case can be properly taken in hand by an official only of the one aspect of medical science, the other aspect has to be left to private medical enterprise."

Professor Harris' always facile pen presented the case for state medicine with great persuasiveness, and not until the very end of his paper did he show that he realized there might be at least one potential danger in the plan.

"More real as a factor working for failure is the ingenuity of human nature to wreck the fairest scheme ever put forth by the human brain. The odious system of political patronage, whereby incompetent persons can be appointed to positions intended to be filled by experts can blast schemes that are brightest."

1920

Far from any criticism of these advanced ideas in our own *Journal* there was a lengthy editorial in support of them!⁵ But so far as any policy of the Association was concerned this could hardly be regarded an official view. From 1920 on until 1928, however, practically nothing was done by the Association in the matter. The necessity to strengthen its own position was paramount and its activities were almost entirely scientific and administrative.

1929

In 1929, however,⁶ two special articles were contributed by Dr. J. H. MacDermot, of Vancouver, which are valuable landmarks in our historical survey. It was shown that the British Columbia Medical Association had been engaged in studying the question for some years and a comprehensive report had been prepared for them by a statistical expert. This had been prompted by the action of the British Columbia Legislature, which had appointed a Royal Commission in 1919 to take evidence and consider the whole question of health insurance. This Commission had examined the matter very

thoroughly and their report was presented to the Legislature in 1928, but no immediate action had resulted. The public demand for health insurance was becoming more and more insistent in that Province and Labour had adopted it as a measure to be worked for.

The British Columbia profession therefore were keenly aware of the trend of popular thought, and realized clearly that some form of health insurance was inevitable.

"What", it was asked, "should be the attitude of the medical profession towards health insurance? At present, I take it, mainly expectant. We are not supporting, even less initiating, any scheme; nor are we opposed to health insurance. We should be willing, and, I am sure, we are willing, to support and help to implement any wisely designed measure calculated to improve social conditions, to lessen sickness, and to prevent disease. We should be ready, and equipped, to advise the Legislature as to what is sane and wise, and what would be shortsighted and dangerous legislation. To so equip ourselves we need to study the whole problem. We should be not only an enlightened body but a united one. Not merely the province of British Columbia, not merely a few committees and individuals in the province, should have a knowledge and understanding, but the medical profession throughout Canada should be kept in touch, and should be co-ordinated and united. The Canadian Medical Association, which has never failed to function as a truly national organization, should, we feel, be constantly in touch with the situation here, and give its advice and support."

There is little in these two articles that would need to be changed today. The interests of the people were kept steadily to the fore and the safeguarding of medical practice insisted on.

"Further, the conditions of medical practice, as they are found in Canada, should be carefully guarded, and improved, not impaired. The thought of practising medicine as we sometimes hear of it being done under the panel system is disturbing to our consciences as medical men, even if these are more or less exceptional instances. We could not consent to such a mockery of medical practice, for our own sake, of course, but, far more, for the sake of the people we work for.

"For our part, there must be an irreducible minimum of service, less than which we will not give as competent medical men. How much this is remains to be decided. Its cost is a matter of calculation and can be fairly worked out."

At the Annual Association Meeting in 1929⁷ the Committee of Publicity and Health Education and Public Health suggested that,

"In addition to a study of the voluntary health agencies, a survey of the question of health insurance should at some convenient time be undertaken. This latter task might to advantage be performed in conjunction with other agencies, official and voluntary, interested in the question. The medical profession through the medium of the C.M.A. has here an opportunity to provide leadership in the study of a social question of paramount interest and importance."

One or two papers on health insurance were published in the *Journal*^{8, 9} and the *Bulletin of*

4. *Pub. Health J.*, 1919, 10: 496.

5. *Canad. M. Ass. J.*, 1920, 10: 73.

6. *Ibid.*, 1929, 20: 398 and 513.

7. *Ibid.*, 1929, 21: Supp., p. xi.

8. McCULLOUGH, J. W. S.: *Ibid.*, 1929, 21: 168.

9. ROWAN, A. A.: *Ibid.*, 1930, 22: 831.

the *Vancouver Medical Association* made repeated editorial comments on it, supplemented by another paper by Dr. J. H. MacDermot.¹⁰

1930

At the annual meeting of the Association in Winnipeg in 1930 the Council received a lengthy memorandum prepared by Dr. Grant Fleming as part of the report of the Committee on Public Health. The Committee on Economics also dealt with the matter and referred to the lack of comprehension on the part of the profession, of the issues involved: it said,¹¹

"It would seem advisable that in some way every medical man in Canada should be apprised of the stage that proceedings have reached and the conclusions come to by the British Columbia Medical Association, which has been most closely connected with this—in order that the profession may be a united body, with certain main principles which they would support, and on which they would insist before allowing the profession to become a party to any system of health insurance. These principles are few and simple, and are, it is believed for the benefit of the community as a whole, equally with the medical profession."

Following this the Council requested the Committee on Economics to report on the principles which might be regarded as fundamental in relation to health insurance.

The Presidential address in 1930 by Dr. Harvey Smith had a good deal to say about health insurance.¹²

"At no period in our history has medicine stood higher in public esteem and confidence than today, and never has our profession enjoyed a greater measure of goodwill and public support than at the present time.

"Admittedly, however, certain phases of practice are open to criticism, and the Æsculapian guild is confronted with many problems pressing for solution. These relate mainly to costs, unavailability of medical aid, and lack of qualification. The ground swell of dissatisfaction is felt especially in the west—in British Columbia, for example, where the medical profession frankly admits that State Medicine is impending and plans for dealing with the situation, when it arises, on a basis that will be satisfactory both to the patient and the public."

1931

Dr. E. S. Moorhead wrote a paper on "The Feasibility of a Contributory Health Insurance Scheme for Manitoba",¹³ concluding that a Provincial contributory scheme did not appear to be feasible in Manitoba at the moment. It would be too expensive for the average country district, and the unorganized territories, and far from contributing to the medical service, would probably have to be helped out for some time by a State subsidy.

An editorial by Dr. D. A. Stewart, of Ninette, Man., might also be noticed.¹⁴ Dr. Stewart

dealt with the failure in transmission of medical services, and spoke of the three present bridges across the gulf between the people on one side and medical discoveries on the other. The first was the old tollbridge of Private Practice; the second was the bridge of Charity; and the third, and newest, was the bridge of Public Health Service. Were these bridges to continue to stand? Would others be added, or would the old ones be simply widened? He recalled the saying of Saint Benedict that "The care of the sick is to be placed above and before every other duty".

1932

In 1932 the Committee on Economics referred to the effects of the financial depression on medical practice.¹⁵ The resulting numbers of indigents was a problem which bore very directly on the report just brought down by the Royal Commission on Health Insurance in B.C., since that Report contained no provision for the medical care of these indigents, and the expense of this was still a very heavy burden on the profession. It was at this time that the Committee on Economics was authorized by the Executive to prepare a plan or plans for health insurance, these to be passed to the various Provincial Associations for their consideration, criticism and suggestions.

1933

In 1933 Dr. R. A. Dick, of Canora, Sask.,¹⁶ showed that the problem in Saskatchewan was very different from that of B.C., and summarized the social and medical legislation already passed in Saskatchewan as follows:

"In 1916 the Union Hospital Act: 1918, free distribution of biological products: 1919, free treatment of venereal disease at government dispensaries: 1920, amendment to the Municipal Act, making provision for the engagement of municipal doctors: in 1924 rural and urban tuberculosis pools were started: 1919, maternity benefits in the form of \$25 grant (withdrawn in 1931): 1929, free treatment of tuberculosis with no expense to the patient for the whole province: 1930, passing of the Act to form cancer clinics: 1930, Workmen's Compensation Acts."

Dr. Dick's paper contained also a large amount of statistical data on health costs in Saskatchewan.

1934

A corresponding statement on the financial aspects of health insurance in Alberta was prepared by Dr. G. E. Learmonth in 1934.¹⁷ He also gave a report by the College of Physicians and Surgeons of Alberta as to their views on health insurance.

In this year the Committee on Economics presented to Council at the annual meeting its "Plan for Health Insurance in Canada".¹⁸

10. *Canad. M. Ass. J.*, 1930, 23: 173.

11. *Ibid.*, 1930, 23: Supp., p. xviii.

12. *Ibid.*, 1930, 23: 336.

13. *Ibid.*, 1931, 24: 254.

14. *Ibid.*, 1931, 24: 700.

15. *Ibid.*, 1932, 27: Supp., p. xxi.

16. *Ibid.*, 1933, 28: 114.

17. *Ibid.*, 1934, 30: 79.

18. *Ibid.*, 1934, 31: Supp., pp. xxv et seq.

This report was not only a summary of developments in this field, but constituted a balanced view of the situation which made it a most important historical document. It paid special attention to the vexed question of medical care of indigents, one of the most urgent medical problems in the country. It then put forward in detail its plan for health insurance. It was here that there first appeared an enunciation of the principles on which it was felt that a scheme of health insurance should be based. In some respects these principles form an interesting comparison with those later evolved.

The Report concluded with an exhaustive bibliography on health insurance. It was signed by W. Harvey Smith, chairman, and A. Grant Fleming, secretary. The outstanding qualities of this Report were at once recognized and it was re-issued in pamphlet form.

There was at once an animated discussion on this report, but naturally no decision was looked for before there had been a prolonged study. To this end the report was circulated to all Provincial Associations, with the request that they send in suggestions with a view to further consideration. Among the comments on it were those of Dr. Alfred Cox, former Secretary of the British Medical Association. He offered criticism as well as praise.¹⁹

1935

In February, 1935, Dr. D. E. H. Cleveland, of Vancouver, described the situation in British Columbia, with regard to the forthcoming Provincial legislation health insurance.²⁰

There were also various comments on and analysis of the proposed Health Insurance Act for British Columbia,^{21, 22, 23} and the Report of the Health Insurance Committee of the College of Physicians and Surgeons of British Columbia was also published.²⁴ This was first presented at a meeting of the College at which there was a large attendance. Resolutions were passed formally asking the Canadian Medical Association for its support. The Report was submitted to the Government Hearings Committee. A summary of the representations made to that body on health insurance by various organizations is given, and reference is made to the public interest in the matter: a very interesting account. It was unfortunate that an unauthorized newspaper account in Vancouver gave a wrong impression of the attitude of the doctors to the Bill, accusing them of opposing it.

At the Annual Association Meeting in 1935 prolonged discussion took place on the proposed

plan for health insurance. The following resolutions were passed:²⁵

"1. That in the event of health insurance being initiated by any authority, in any section or area of Canada, the Canadian Medical Association endorse the principles governing a health insurance plan as laid down in the Report of the Committee on Economics as presented at the annual meeting in Calgary in June, 1934.

"2. Whereas, it has been brought to the attention of this Council that the Ministers of Health of Canada, meeting in Ottawa, proposed that a Royal Commission be appointed to make a survey of Canada in respect to the health services of Canada; Be it Resolved by this Council that we heartily approve of such a survey being made, and that the Commission be given the widest possible powers; and, furthermore, we respectfully submit that before any scheme of health insurance be enacted in any part of Canada it would be the part of wisdom to see that such a survey has previously been made.

"3. That a copy of the above resolutions be sent to the Provincial Medical Associations for their information, with a covering letter stating that, while the C.M.A. has neither the desire nor the authority at this time to make any pronouncement for or against health insurance, Council feels that the above-mentioned resolutions would be of definite value to any part of Canada, as indicating the opinion of Council with regard to the principles underlying any possible plan of health insurance."

The Report of Proceedings of the Executive Committee on October 31, 1935,²⁶ describes in detail the work carried out in support of the British Columbia profession in relation to the Health Insurance Act in that Province. A desire was expressed for the General Secretary, Dr. Routley, to be present in British Columbia when the Bill came up in the House in order to support the point of view of the Canadian medical profession in general.

It was also reported that in Alberta the Health Insurance Act for that Province had not been promulgated and was not likely to be.

A good account of a radio address on health insurance in British Columbia by the Honourable Dr. G. M. Weir is given.²⁷ It bears re-reading.

1936

The British Columbia Health Insurance Act was finally passed after much modification of the original draft.

An editorial in the *Bulletin of the Vancouver Medical Association* is quoted in full in the *Journal*.²⁸ The opening paragraphs only will be reproduced here.

"We have been criticized for opposing the Bill. Well, we admit that freely. The original draft Bill was not in any way perfect; in many ways it was bad; but it was a long way better than this one. It *did* purport to look after *all* the members of the community whose yearly income, whether from indigence or low wages, fell below a certain level. It *did* acknowledge the fact that the Government should contribute to the

19. *Ibid.*, 1935, 32: 436.

20. *Ibid.*, 1935, 32: 195.

21. HARRISON, B. J.: *Ibid.*, 1935, 33: 433.

22. CASSIDY, H. M.: *Ibid.*, 1935, 33: 197.

23. *Ibid.*, 1935, 33: 188.

24. *Ibid.*, 1935, 33: 547.

25. *Ibid.*, 1935, 33: Supp., p. xxx.

26. *Ibid.*, 1936, 34: 202.

27. *Ibid.*, 1936, 34: 116.

28. *Ibid.*, 1936, 34: 685.

Act, by at least half the cost of administration. It *did* acknowledge the medical profession. It seemed to recognize the fact that medical men will be necessary in the working of this Act, and it gave us a certain amount of say in the administration of the Act. It *did* make some attempt to ensure that the income obtained from assessments, etc., would more nearly meet the necessary outgoings.

"But gradually, under the pressure, not of clearer knowledge and riper judgment, but of political necessity, this Bill was pruned and shorn of these characters—till after a battle, never equalled, as we believe, in these parts at least, the Bill has emerged, a sorry enough spectacle. For it is a pale shadow of its former self, anemic and paralyzed in its lower limbs, or lower income-levels, if you prefer. It no longer makes a pretence at humanitarianism, which we were led to believe was the main impulse animating its progenitors. The indigent, the domestic servant, the casual labourer, the part-time workers, those in receipt of old-age and mothers' pensions, in fact all the people who really need medical aid the most, and cannot afford it at all, are or may be excluded. The Government's contribution is removed. The contributions from those who do pay are not sufficient, on any calculation, to give what we would consider to be an adequate medical service."

The Canadian Medical Association passed the following resolution at its annual meeting.²⁹

"That the C.M.A. reiterate its stand on the question of a Royal Commission being appointed to make a survey of Canada with regard to health insurance.

"That this Council endorse the spirit of the principles governing the health insurance plan as laid down by the Committee on Economics at the Calgary meeting in 1934.

"That this Council, believing it to be the duty of the Canadian Medical Association to interest itself in the broad subject of health insurance on behalf of the medical profession and the people of Canada, hereby instructs the incoming Executive Committee to take such steps as they consider advisable to assist the provincial medical associations in all such studies.

"That the Committee on Economics be instructed to study, clarify and amplify the principles of health insurance as laid down in the report of the Committee on Economics and approved at the meeting in Calgary in 1934.

"That the incoming Executive Committee be instructed to take whatever steps are necessary to investigate socialized medicine and be prepared to bring in a report to the next annual meeting."

1937

The Association asked the General Secretary to visit Great Britain and Europe with a view to studying the actual operation of health insurance in those countries.

The Report of the annual meeting contains a full report of the Committee on Economics, reviewing the situation and giving an up-to-date account of trends in British Columbia, Alberta, Manitoba and Ontario. A reference to what had happened in British Columbia was made and a clear account was given of the facts surrounding the passage of the Health Insurance Bill in that Province.³⁰

1938

The Association made a Submission to the Royal Commission on Dominion-Provincial Relations,³¹ in which amongst other subjects, it

dealt with health insurance and reiterated the principles on which it felt this should be based. It was pointed out that the Association had not authorized an expression of opinion either in favour of, or opposed to health insurance, but merely set forth the principles which it felt should be followed.

It was also urged that before health insurance was applied in Canada a survey of medical services should be carried out in which the Association offered all the facilities at its command.

The Committee on Economics issued a 36-page report on medico-economic conditions, especially in British Columbia, Manitoba, Saskatchewan and Ontario.³²

The Committee on Economics was instructed to canvass the Provincial Medical Association to find out the position of each Province in regard to the Association defining a policy for or against health insurance.³³

1939

The Report of the Committee on Economics, under the chairmanship of Dr. Wallace Wilson, was extraordinarily complete. It covered the field in Canada and also gave an account of health insurance schemes in New Zealand and Australia.³⁴

The Committee undertook the following work at the request of the Executive Committee.

1. The collection of all information available concerning medical service schemes in operation or contemplated in any part of Canada.

2. A study of contract practice.

In addition, the Committee had invited the Provincial bodies, now known as Divisions, to undertake the following:

1. An examination of the present status of lodge practice.

2. A study of voluntary health insurance and voluntary hospital insurance.

A most informative report was given on the results of the questionnaire asking for definition of the position of the Association regarding health insurance. These must be read in their entirety. They showed considerable divergence of views. One Province advocated waiting and educating the profession in medical economics. Another recommended modifications of the Principles laid down by the Association. Another felt that the Association should define its policy, but no suggestions were made as to what that policy should be.

The recommendation of the Committee was that the Association should undertake a broad and comprehensive study of the field of medical economics: that it should begin a campaign of educating the profession in medical economics, using all available methods and perhaps having

29. *Ibid.*, 1936, 35: Supp., p. xxiv.

30. *Ibid.*, 1937, 37: supp., p. xxiii.

31. *Ibid.*, 1938, 38: 286.

32. *Ibid.*, 1938, 39: 292.

33. *Ibid.*, 1938, 39: 592.

34. *Ibid.*, 1939, 41: Supp., pp. xxxviii et seq.

a specially trained worker in charge of the work.
No attempt should be made by the Association to draft independently a plan of compulsory health insurance.

The Committee felt that

"... in this matter, involving as it does so much of policy and finance, the Government must be the lead horse and that the Canadian Medical Association should be an essential and recognized running mate. It further believes that if the Canadian Medical Association were to approach the Government, particularly after further study and investigation, it could assure for itself that position."

Attention was drawn to the fact that discussions on the subject of state medicine had begun in Parliament on March 7, 1938, and were renewed in March, 1939.

In this year (1939) there appeared the first two articles of a series of Mr. Hugh H. Wolfenden on Medical Economics. These were continued in the following year and were afterwards published in booklet form under the title of "Problems of Medical Economics". The book is a valuable study of the subject. Mr. Wolfenden was appointed consultant in Medical Economics.

1940

The Report of the Committee on Medical Economics³⁵ dealt largely with accounts of various medical service schemes in Manitoba, Ontario and British Columbia.

In spite of the demands of the war much work was accomplished by the Committee.

Extracts were given from the Report of the Royal Commission on Dominion-Provincial Relations, with regard to Health Insurance. In this Report no objection was seen to the establishment of health insurance by a Province.

The program of the Annual Meeting began to feature health insurance in a "Medical Economics" evening.

1941

The following statement was made to Council at the Annual Meeting.³⁶

"The President and Chairman of General Council were invited to attend a meeting in Ottawa on June 13, called by the Deputy Minister of Pensions and National Health to consider the rehabilitation of returned men and post war and public health services in relation to the population of Canada as a whole.

"It was felt that, in case representatives of the Association are again requested to meet the Department, they should be in a position to make some pronouncement with regard to the relation of the Association to the question of health insurance. The following points were agreed upon:

"1. The Canadian Medical Association is in favour of any plan to make available for every Canadian the full benefits of curative and preventive medicine, irrespective of individual ability to pay, which at the same time is given at a rate of remuneration which is fair to the public and to the practitioners of medicine and others associated in the provision of medical care.

"2. The Canadian Medical Association is not in favour of State Medicine—a system of medical administration by which the State provides medical services for the entire population or a large part thereof and under which all practitioners are employed, directed and paid by the State on a salary basis or otherwise."

"3. The Canadian Medical Association considers as a necessary requisite for any plan of community medical service adopted, the unification of curative and preventive medicine in medical practice."

Arising out of this meeting with the Department, the Executive of our Association asked the Department for the appointment from the Association of a committee to aid in conducting the studies on and formulating any plan of health insurance that might be developed. By agreement with the Minister the following committee was appointed: Drs. G. S. Fahrni, A. E. Archer, T. H. Leggett, Wallace Wilson, L. Gérin-Lajoie, C. J. Veniot, T. C. Routley. This was called the Committee of Seven. It began its work immediately, with the decision that before any steps were to be taken to draw up plans for health insurance the views of the profession should be obtained by means of a questionnaire. This later was acted on.

1942

In February, 1942, an Order-in-Council created an Advisory Committee on Health Insurance, with Dr. J. J. Heagerty of the Department of Pensions and National Health as Chairman. Dr. Heagerty explained in a letter to the *Journal*³⁷ the events leading up to the formation of this Committee. He said that the fact that it included no medical men except himself, the others all being drawn from the Civil Service, was based on the idea of leaving the medical profession "free, to suggest, recommend, approve, disapprove, reject and withdraw from any health insurance plan that did not meet with their approval". The profession would always be allowed to express its views frankly and freely.

The duties of this Advisory Committee were to study all factual data relating to health insurance, especially those relating to costs.

Dr. Heagerty went on to say—

"As the medical profession is the most important body concerned with the provision of medical benefits, the Committee of Seven appointed by the Canadian Medical Association is considered the 'senior' committee and no steps will be taken by 'The Advisory Committee on Health Insurance' without consulting that committee. This is felt advisable because it is known that in no country in which the medical profession has not been fully consulted in the formulation of a health insurance plan has health insurance been an unqualified success. The Committee of Seven have indicated their willingness to co-operate with the writer to the fullest extent and have clearly demonstrated their interest not only in maintaining the high standards of the medical profession but in providing the public with a comprehensive health insurance plan that is in the best interest of the general public."

35. *Ibid.*, 1940, 43: Supp., p. xxv.

36. *Ibid.*, 1941, 45: 25.

37. *Ibid.*, 1942, 46: 389.

This Committee of Seven therefore, whilst an Association Committee, was one that met independently of the Committee on Economics. It was inevitable at first that much of the information it gathered from the Departmental Advisory Committee had to be treated confidentially, but at no time did it make any decisions without full consultation with the Executive of the Association.

At the Annual Meeting³⁸ the Chairman of the Executive reported that whilst no definite outline of the views of the Department of Pensions and National Health had been announced, it was quite clear that plans were being made for health insurance, and it was apparent that the Association would now have to crystallize its views on the subject and to take such action as it saw fit to state its position to those in authority who were drafting the legislation.

The Executive Committee had met the Departmental Advisory Committee and had discussed the clauses of the proposals drafted by that Committee. Our Executive were advised, however, that since these proposals were still incomplete they must be treated as confidential and could not be passed on to the profession generally. It was to allow the Association to keep in touch with the Departmental Committee that the Committee of Seven already mentioned, was appointed.

The results of the questionnaire on health insurance were announced at the Annual Meeting. It was clear that the profession overwhelmingly supported the Principles laid down by the Association the vote being roughly 90% for and 10% against, with the exception of the voluntary hospitalization privileges which showed a vote of 1,912 for to 486 against. The questionnaire with the answers is published in the Proceedings.³⁹

The following resolution was passed by General Council.

"That, in as much as plans for Health Insurance are being studied by the Federal Government, the medical profession through the Canadian Medical Association should assist in the formulation of any plans which may be put forward as bases for the enactment of health insurance."

It was further decided to place in the hands of the Government the 20 principles enunciated by the Association, and that the Association should not attempt to write a Bill of Health Insurance, but through the Committee of Seven should keep itself informed as the drafting of the Bill proceeded.

1943

In January, 1943, a special meeting of the Council of the Association was held in Ottawa to consider and define its position with regard to health insurance.

38. *Ibid.*, 1942, 47: Supp., p. iii.

39. *Ibid.*, 1942, 47: Supp., p. iv.

The following resolution was brought before the Council in plenary session, and after some discussion was unanimously adopted.⁴⁰

"Whereas the objects of the Canadian Medical Association are:

"1. The promotion of health and the prevention of disease;

"2. The improvement of health services;

"3. The performance of such other lawful things as are incidental or conducive to the welfare of the public;

"Whereas the Canadian Medical Association is keenly conscious of the desirability of providing adequate health services to all the people of Canada;

"Whereas the Canadian Medical Association has for many years been studying plans for the securing of such health services;

"Therefore be it resolved that:

"1. The Canadian Medical Association approves the adoption of the principle of health insurance;

"2. The Canadian Medical Association favours a plan of health insurance which will secure the development and provision of the highest standard of health services, preventive and curative, if such plan be fair both to the insured and to all those rendering the services."

In March, 1943, a Special Committee on Social Security was appointed by Parliament to examine and report on a national plan of social insurance. At its first meeting it received for consideration the report of the Advisory Committee on Health Insurance which included a Draft Bill on the subject.

At one of its early meetings the Parliamentary Committee received a brief from our Association, setting forth our views on health insurance, and assuring the Committee of the desire of the Association to render all assistance possible in the matter.

This submission was printed separately and widely circulated.

Since then the Committee on Economics, with us a committee on health insurance, has been constantly engaged in examining the draft Bill and in submitting suggestions to the Drafting Committee and the special Parliamentary Committee.

As regards the Draft Bill itself it should be noted that it was entirely the work of the Government Departmental Committee. The Association had fully exercised its right in criticizing its provisions. Up to March, 1944, the Bill had not been presented in the House. Apparently the latest Draft form (as of that date) is that which will be presented to Parliament. It is understood however that it will probably undergo much alteration during its passage through Parliament.

COMMENT

Two points in the survey may be commented on. In the first place there is the part played by the profession in British Columbia. That Province really was the scene of what might be called a full dress rehearsal of a local (Provincial) attempt to solve the problem of health insurance. The efforts of the British Columbia

40. *Ibid.*, 1943, 48: 93.

medical profession towards the working out of a reasonable scheme were prolonged and wholehearted. At no time was there ever the least hint of self-seeking on their part. There never could be any mistaking their desire to meet the need for better distribution of medical service, even though it was felt that the profession was already doing its best under the accepted methods of practice. It would be impossible to estimate the gratuitous labour expended by the profession of the Province, involving much financial outlay, in order to gather statistical and other data so essential for a health insurance scheme.

The few extracts taken from the medical literature of those days are an attempt to show something of the warmth of feeling that developed over the Provincial Health Insurance legislation. But it is only by going through the whole series of Bulletins of the *Vancouver Medical Bulletin*—the official organ of the British Columbia medical profession—that one realizes the intense feeling generated. One might almost say with Matthew Arnold

A fever in these pages burns
Beneath the calm they feign.

except that the calm was not always there!

In the second place one is impressed with the difficulty of getting the average medical man to realize the growing importance of the socio-economic aspects of medicine. The efforts to arouse interest in these matters are probably beginning to have some effect now, but, just as in the case of British Columbia, it has required the actual formulation of legislative measures to bring home the urgency of the problem. There is now no need to warn men that changes in methods of practice are impending.

It is difficult to estimate just how much direct influence the views of the profession may have on health insurance legislation, but it is quite certain that the effect would be negligible without the organization of our Association to reflect those views and to give them coherence and weight. In an account such as the foregoing it has not been possible to describe the intensive study given to health insurance in all its aspects by the committees and officers of the Association. The formal reports issued each year give very little idea of the labour which lies behind them.

That it was a remarkable fact that the stress of war had not led to any increase in the incidence of the more serious mental disorders was a statement made recently by Mr. Ernest Brown, lately Minister of Health (Great Britain), at a conference of the Provisional National Council for Mental Health. It was true that at the beginning of the war there had been a sharp rise in admission cases in some instances; but before the end of 1941 the curve had dropped, and admissions to institutions since then had been substantially below the average. The most probable explanation was that this was due to the improvement in employment.—*J. Roy. Inst. of Hyg. & Pub. Health*, 1943, 6: 299.

Clinical and Laboratory Notes

UNPADDED PLASTER CASTS*

By F. H. H. Mewburn, M.D., F.R.C.S.(C)

The unpadded plaster has been in the limelight of the surgical stage for some little time now, along with such other celebrities as blood plasma, the sulfa drugs and Stader splinting. On account of the increased mechanization of not only our military but also our civil population it seems that fractures are on the increase, and therefore all of us are going to see more broken bones and are going to have increased chances for the application of plaster casts. It might be well, therefore, to look into and familiarize ourselves with the technique of handling and caring for plaster casts. One should also become acquainted with the principles of such apparatus as the Hawley table or the Goldthwait irons, which are such important aids in good plaster work.

It must be remembered that the plaster cast is comparable to a splint. It is a piece of apparatus designed to hold the reduced fracture in position until it has united, or to hold the correction of some deformity which has been obtained by surgical or manipulative methods. The plaster cast does not reduce the fracture or correct the deformity. That has to be done before the plaster is applied. An efficient piece of apparatus must be comfortable, effective, and light. The plaster cast, I think, can fill all these requirements. In the application it can be so moulded to the contours of the body or the extremity that it fits accurately and smoothly. Therefore it is comfortable to wear and holds the part firmly in the corrected position. If made properly, the cast can be strong and light.

Suppose we describe the application of a plaster cast in the ordinary, or, as Sister Kenny would call it, the orthodox way. The fracture has been reduced and the extremity is given to an assistant to hold in the corrected position until the plaster has been applied. This holding job is the most important and the hardest work in the application. If the surgeon has assistants who can put on a plaster, then it is his duty to do the holding. When the holder has things under control, layers of sheet wadding are applied. If too little sheet wadding is used we are likely to get pressure sores and the cast becomes uncomfortable. If too much padding is used the parts cannot be held in position and the reduction of the fracture or the correction of the deformity is lost. Sheet wadding is used in preference to absorbent cotton. It is non-absorbent, stays flatter, and does not tend to lump up as does the absorbent. When sufficient sheet wadding has been applied

*A paper read at the Calgary meeting of the Canadian Medical Association, Alberta Division, September, 1943.

then the bony prominences receive an extra padding of pieces of felt placed over the sheet wadding so that these stick to the plaster when it is applied. If the felt is placed next the skin and the sheet wadding laid over it the felt will slip and slide around so that it does not protect the bony points. The plaster bandages are next applied. They should not be pulled or reversed, but should be laid flat and smoothly, so that no ridges occur on the inside of the cast. As soon as the bandages are all on, the holder can then wiggle his hand out of the cast, and while the cast is setting it is carefully moulded so that the finished cast has the same shape as that of the part which it covers. When the cast has set, it is trimmed out with a plaster knife so that the tips of the toes and fingers can be seen in order that the circulation can be easily checked. The cast is supported on pillows and exposed to the air until it is dry, when any additional trimming can be done and then the edges are cuffed with adhesive.

By an unpadded plaster, I mean one that has the plaster applied directly to the skin or directly over not more than a single layer of stockinette. The only padding used is some felt pads to protect the bony prominences, such as the malleoli, the styloid processes of the ulna and radius, and bony points about the elbow.

I am unable to see any advantages of the unpadded plaster over the so-called orthodox plaster, which has furnished the method of plaster fixation for so long. If the reduction of the fracture or deformity cannot be maintained by the plaster cast with adequate padding, then some other form of treatment must be used; changing to the unpadded type of cast will not be sufficient. The fact that the unpadded cast is very much in the public eye at present makes it very likely to be preferred by those who are rather inexperienced in plaster work, and for that reason alone I am against it. It is not in use following orthopaedic operations, where the orthodox plaster is the method of choice. There are three main points against the unpadded cast. They are; formation of pressure sores, the difficulty of removal, and disturbance of circulation.

In the first place, I think the unpadded plaster is more likely to cause pressure sores than the one with adequate padding. The actual plaster against the skin may irritate it so that a very troublesome dermatitis results. In the application the skin becomes smeared with plaster, which, after setting, becomes hard and breaks off and acts as a foreign body between the skin and the cast. Ridges may occur during the application, which act much the same as foreign bodies and the plaster itself may be laid on too tight around a bony point. This latter occurs when the felt pad slips off the prominence it is supposed to protect.

This pressure sore business is a serious one. It is not only uncomfortable to the patient, but it prolongs treatment and may even cause some

permanent disability. I have in mind a patient who sustained multiple simple fractures and who was treated with unpadded plasters. On transfer to the orthopaedic service some time later, his morale was low and he was complaining of a lot of pain under the casts. Removal of the casts showed that he was not a chronic complainer, as reported, but that he had multiple pressure sores of various sizes and depths. As practically all of his fractures required open reduction, I think one can see how his treatment has been lengthened and the chances of his having some permanent disability are greatly enhanced, to say nothing of all his discomfort.

I must mention one very important and standing order that must be observed in looking after people in plaster casts. If a patient continually complains of pain, it means trouble, and this should be investigated carefully even if it requires removal and re-application of the plaster. In a situation of this sort don't try and kid the patient that there is nothing wrong and that he will be all right. You have to be suspicious yourself and investigate to see that nothing is wrong.

I do not know how many of you have had the opportunity of removing an unpadded plaster. I have, on many occasions, and it is best described as a desperate job. There is no space between the plaster and the skin to insert the plaster cutter. You hurt the patient and he jumps back. You try again and he draws away just as we all do in the dentist's chair, when he gets close to that tender point in the tooth. Tempers and temperatures on both sides rise. If you discard the cutter and use a plaster knife you are on the skin before you know it. And it does not improve matters to add a gush of blood to the picture. Finally, when you have got the cast cut and try to remove it, you find it is held in place by the hairs. The pulling on these hairs can be anything from very annoying in the hairless type of individual, to downright torture in the case of the Esau-like patient. I do not think that the supporters of this type of cast have considered sufficiently the difficulties of removal. They apparently have hordes of internes to go through the blood, sweat and tears of the removal, while they appear at the right time as a sort of guardian angel to rescue the patient from those cruel and barbarous house officers.

With regard to the third and last point, it has been our experience that the circulation in the leg that has come out of an unpadded plaster is poorer than one which comes out of an orthodox one. There are more swollen, painful and oedematous legs than are found after fixation by the plaster cast with adequate padding. It would seem that the unpadded cast does not give the blood vessels any chance to exercise tone, and when the unyielding support is suddenly taken away, it thrusts such a load on the blood vessels that we get these large, oedematous, discoloured, legs. All the

non-padded cast enthusiasts apply elastoplast bandages to support the tissues till the blood vessels recover their tone.

I think, therefore, that with the many more of us who are going to have to apply casts either in civil or military life, my best advice is to learn the technique of the application of plaster casts with adequate padding. By and large, this type of cast has given good results over a longer time than the unpadded plaster has been in vogue.

The unpadded plaster might be compared to driving a motor car with one hand. Some years ago in one of the motor journals there was an article advocating safer driving on the highway. It gave a list of several "don'ts" and one of them was driving a motor car with one hand. The author went on to say "I only know of two men who could drive a car with one hand. They are Barney Oldfield and Eddie Rickenbacker, and they don't."

416 McLeod Bldg.

Editorial

THE HOSPITAL PATIENT AFTER DISCHARGE

THERE is a problem in the integration of medical services quite as much as in their distribution and availability. Those who work in outpatient clinics know this only too well. How often is there a feeling of frustration in the "following-up" of patients discharged from the ward. Advice is given and some treatment and yet in many types of disease it is obvious that much of this is wasted because of other factors which the out-patient physician cannot deal with in the clinic. Neither do convalescent homes and social service work provide all the answers, essential as their roles may be.

Experiment in the extension of hospital service by the integration of all these elements has recently been in operation and the results are now reported on in a short but extremely interesting account published by the Commonwealth Fund.*

As is not infrequently the case this, study developed from something else, namely, a teaching exercise originating in Syracuse University College of Medicine in 1930. At that time it was felt by the teaching staff that medical education was becoming too institutionalized, and that disease itself was being stressed rather than its host, the patient. Each student was therefore required to make a complete study of at least one patient assigned to him during his medical ward service. This demanded personal investigation of the social, economic and hereditary elements and their part in the patient's recovery. The value of this teach-

ing exercise was demonstrated beyond any question, but it also became apparent to those participating in it that the medical care of most of the patients after discharge was very unsatisfactory. Investigation showed at least three striking facts:—

1. About 90% of the cost of hospitalization in the medical wards was for chronic illnesses.
2. Only about one-third of the patients received satisfactory medical supervision after discharge.
3. Hospital days could have been lessened and admission cut down with intelligent supervision after discharge.

It really became a question of continuing medical care which had been started in the ward, and it was felt that the logical way to do this was by a physician appointed by and working in close association with the hospital, and using to the utmost the social service of other agencies.

It hardly needs the evidence of the cases quoted in the report to show the value of such service. Hospitalization was lessened, thus enabling more patients to be treated, and, most important, more complete medical attention was provided.

The demonstration shows that the hospital is the pivot around which revolve the various services devoted to the maintenance of health, but the physician must direct and co-ordinate their application in each case, beginning with the close and detailed ward examination and treatment and extending to the supervision after discharge.

Unless means are found to provide for continuity of the physician-patient relationship the value of hospital care will always remain impaired.

* Medical Care of the Discharged Hospital Patient. F. Jensen, H. G. Weiskotten, M. A. Thomas. 94 pp. \$1.00. Commonwealth Fund, New York, 1944.

Editorial Comments

The Supply of Penicillin

There is some prospect of penicillin being available for general civilian use within the next five or six months. Two sources of supply have been established, the Connaught Laboratories in Toronto, and a Government-owned laboratory in Montreal, operated by Messrs. Ayerst, McKenna and Harrison. Apparently, progress in the production has been more rapid than was anticipated.

At the same time a research program on penicillin is being carried out in the Banting Institute under the auspices of the National Research Council. Part of the limited quantity produced weekly is sent to the Joint Services Penicillin Committee and part to Montreal and Toronto for the clinical investigation of its effects. After meeting these demands the remaining penicillin is distributed for civilian use in the treatment of proved cases of staphylococcal septicæmia and staphylococcal and pneumococcal meningitis.

The Universities' Federation for Animal Welfare

The Universities' Federation for Animal Welfare of London (U.F.A.W.) has begun the preparation of a book on the care and management of laboratory animals. This is to deal with the care of the many varieties of animals used in laboratory work, such as rabbits, guinea pigs, mice, birds, ferrets, frogs and fish. It will also include chapters on the training of laboratory assistants and the law and practice of animal experimentation. The Federation, in its desire to make the book as complete as possible, is asking all interested in laboratory animal work to send in suggestions on such details as anaesthesia, feeding and watering, euthanasia, sources of supply, general management and psychological considerations.

The address of the Federation is 284, Regent's Park Road, Finchley, London, N.3, England.

The Responsibility for Engaging an Anaesthetist

A recent Division Court decision in Ontario is of considerable interest to the profession generally, especially surgeons and anaesthetists.

Dr. Chadsey, of Brockville, was asked to give anaesthetics on four different occasions to two members of the same family. When he came to collect his bill of \$25.00 the father of the patients refused to pay, and the matter was taken to court. The suit was dismissed with costs, on the ground that the surgeon had not been authorized by the party employing him to engage an anaesthetist. It was argued in reply that there was an implied contract which

rendered the party receiving the benefits liable, but the judge took the opposite view.

There was no appeal from the decision as the amount involved was less than \$100.00, and the case is therefore closed.

We have nothing to say as to the legal aspects of this case, but would draw attention to the apparent weakness of the Medical Act of Ontario in respect to the engagement of anaesthetists. Its provisions might be extended to include another doctor who renders professional aid incidental to the medical services of the patient's physician or surgeon. In the meanwhile, those giving anaesthetics should bear in mind that their accounts may be disputed unless an understanding has been reached beforehand with the responsible parties.

Vitamin Mixtures in U.S. Pharmacopœia

The first bound supplement to U.S.P. XII contains two newly included vitamin mixtures, hexavitamin and triasyn B, in both capsule and tablet form. Hexavitamin contains vitamin A from natural (animal) sources; vitamin D from natural (animal) sources or as activated ergosterol or activated 7-dehydrocholesterol; ascorbic acid; thiamine hydrochloride; riboflavin; and nicotinamide. Triasyn B consists of thiamine hydrochloride; riboflavin; and nicotinamide.

The value of vitamin mixtures under certain vitamin deficiencies is now unquestioned. These two additions to the pharmacopœia are welcome in that they have been thoroughly investigated and may be accepted without question as being effective. They provide a reliable method of dispensing vitamins amongst the welter of preparations which are put forward.

Medical Economics

THE CANADIAN MEDICAL PROCUREMENT AND ASSIGNMENT BOARD

Summary of National Health Survey Report

The Canadian Medical Procurement and Assignment Board was established by Order-in-Council, P.C. 6185 in July, 1942. The primary function of the Board was to secure physicians for the Armed Forces and at the same time to endeavour to preserve adequate medical services for the civilian population. As time went on it became apparent that the health services of the country as a whole required to be studied and that this involved physicians, dentists, nurses, hospitals, medical schools, public health, medical research, industry, and the community generally.

The following is the personnel of this Board:

Medical Director General (Navy), Surgeon Captain A. McCallum.
Director General of Medical Services (Army), Major-General G. B. Chisholm (Chairman).

Director of Medical Services (Air), Air Commodore J. W. Tice.
 Department of Pensions and National Health, Dr. Ross Millar.
 Medical Director of National War Services, Dr. H. H. Christie.
 A representative of the Director of National Selective Service, Mr. L. E. Westman.
 Five members of the Canadian Medical Advisory Committee (Central) appointed by the Canadian Medical Association, Dr. T. C. Routley (General Secretary), Dr. A. E. Archer, Dr. F. S. Patch, Dr. Léon Gérin-Lajoie, Dr. T. H. Leggett.
 Director of Dental Services, Brigadier F. M. Lott.

To permit of the widening of the scope and character of the Board's activities, and particularly to make possible a National Survey, amending Orders-in-Council, Nos. 10360, November 17, 1942, and 10934, December 1, 1942, were passed. The duties of the Board were then set out as follows:

"to determine the number of physicians, dentists, nurses and medical and dental technical personnel available for appointment to the armed forces; to allocate medical and dental officers and medical and dental technical personnel in proper proportions for appointment to the three branches of the said forces; to consider in relation to the requirements of the armed forces the requirements of civilian medical and dental services and war industries; and to make surveys and investigations with respect to the availability of physicians, dentists, nurses and medical and dental technical personnel in order that adequate provision may be made for the future requirements of the armed forces."

The Survey was launched in January, 1943, and completed in six months. It was carried out under the direction of the Board ably assisted by the following:

1. Nine Divisional Advisory Medical Committees appointed by the Canadian Medical Association in the nine provinces.
2. The Dominion Council of Health, represented by Dr. J. J. Heagerty.
3. The Canadian Nurses Association, represented by Miss K. W. Ellis.
4. The Canadian Dental Association, represented by Dr. D. W. Gullett.
5. The Canadian Hospital Council, represented by Dr. Harvey Agnew.
6. The Associate Committee of Medical Research of the National Research Council, represented by Dr. J. B. Collip.
7. The Committee on Industrial Medicine of the Canadian Medical Association, represented by Dr. J. G. Cunningham.
8. The Deans of the nine Medical Schools in Canada.

The Study Groups had twelve full time field secretaries placed at their disposal for a period of three to six months being medical officers loaned for the purpose by the Army, Navy and Air Force Medical Services.

Those in charge received the loyal and voluntary assistance of literally hundreds of nurses, dentists and physicians scattered from the Atlantic to the Pacific. The Report as finally compiled and as tabled consists of ten Parts as follows:

- | | |
|-----------|-------------------------------------|
| Part I | — Introduction |
| Part II | — Civilian Medical Manpower |
| Part III | — Medical Schools |
| Part IV | — Public Health |
| Part V | — Hospital Personnel and Facilities |
| Part VI | — Industrial Medicine |
| Part VII | — War Medical Manpower |
| Part VIII | — Nurses |
| Part IX | — Dental Services |
| Part X | — Recommendations |

While each special group was responsible for its own report, the Report in its entirety was put together by the Board at Ottawa, mainly by the efforts of Squadron-Leader Sellers and Lieutenant Willard, both of whom rendered notable service in the whole task.

The Report is so voluminous (approximately 350,000 words) and so detailed in its factual findings that to summarize it would be an almost impossible task. Attention, however, is directed herein to some of the salient points.

PART I—INTRODUCTION

This indicates the scope and breadth of the Survey and makes reference to the large number of organizations and persons who voluntarily assisted in carrying out the work.

PART II—CIVILIAN MEDICAL MANPOWER

This section of the Report consists of some 200 pages setting forth for Canada as a whole:

- (a) Number of physicians in the country.
- (b) Present location and distribution.
- (c) Age and marital status.
- (d) Nature of work performed.
- (e) Population served and area covered.
- (f) Changes in location of physicians since 1939.
- (g) Availability for Armed Services or civilian assignments.
- (h) Existing surpluses and deficiencies in medical personnel.

By the use of questionnaires, personal visitations, and reference to all available data, records were established and a card index system set up which has made available for permanent use most valuable information such as was never before assembled in Canada.

The Report reveals for Canada as a whole and for each of its provinces, the present supply of physicians, the demand of the people for medical services, the movement of physicians, the type of work in which they are engaged, and their availability for military and civilian purposes.

In March, 1943, Canada's medical population totalled 12,235. Of this number 3,006 were in the Armed Forces. Of the remaining 9,229 physicians, 8,614 were active while 615 were living in retirement. NOTE: As of March 1, 1944, there are 3,589 doctors in military service.

There has been a steadily growing demand of the services of physicians under wartime conditions. In an average year there are between five and six hundred disabling illnesses per one thousand population, that is illnesses which involve absence from work and usual

occupation. On the average, 3% of the population is disabled on account of sickness each day during the year. This means that on any day over 350,000 persons are unable, by reason of illness, to pursue their usual occupations.

The annual number of deaths in Canada each year exceed 110,000 and the annual number of confinements exceed 250,000.

Since 1939 there has been a 10% increase in the number of patients treated in hospitals and a like increase in the birth rate.

Active Canadian physicians still in civil life show that only 41.7% of them are under forty-five years of age. The older physicians, particularly that group who were too old to enlist, have had to assume an increasingly heavy burden. Some areas in Canada will be found to have been more denuded of physicians than others—some to the danger point.

In March, 1943, Canada's civilian population was estimated at 11,861,159, being served by 8,614 physicians, or one per each 1,261 persons.

In March, 1943:

Prince Edward Island had 52 physicians, or one to 1,659 persons;

Nova Scotia had 366 physicians, or one to 1,450 persons;
New Brunswick had 198 physicians, or one to 2,136 persons;

Quebec had 2,681 physicians, or one to 1,206 persons;
Ontario had 3,326 physicians, or one to 1,068 persons;
Manitoba had 473 physicians, or one to 1,438 persons;
Saskatchewan had 408 physicians, or one to 2,078 persons;

Alberta had 460 physicians, or one to 1,626 persons; and
British Columbia had 650 physicians, or one to 1,168 persons.

After carefully delineating where the remaining physicians are in Canada, together with their ages and capacity for work, this section of the Report then proceeds to indicate the availability, or otherwise, for military medical services of those yet in civilian life. The information to be found in this section of the Report is not only of great value for war purposes, but will also prove to be of inestimable value in the post-war period when the rehabilitation of our health workers becomes effective.

PART III—MEDICAL SCHOOLS

Part III of the Report deals with Medical Schools of Canada, of which there are nine, one in Nova Scotia (Dalhousie); three in Quebec (Laval, Montreal and McGill); three in Ontario (Queen's, Western and Toronto); one in Manitoba, and one in Alberta. In pre-war years these nine schools graduated an average of 491 students annually. As a war measure the schools were asked to accelerate their curriculum by which three years could be compressed into two.

The total graduates from the nine schools, known and estimated for a five year period, are as follows:

1940 —	599
1941 —	543
1942 —	538
1943 —	951
1944 —	542

It will thus be seen that the first main benefits of the acceleration took effect in 1943, but the flow of 542 in 1944 will be followed by an equal number in another eight-month period. This accelerated programme will provide an average of 745 graduates annually, but they are turned out in a cycle of approximately 540 one year and 950 the next year.

The Army Cadet enlistment, a plan established two years ago whereby medical students were taken on the strength of Canada's Army, has done much to clarify the problem of securing additional medical officers. The students may enlist any time during the last academic session or sessions during University prior to internship. The period of internship is not to exceed eight months, which period may form a part of twenty-four months, during which the prospective medical officer is a private soldier.

The teaching staffs of the medical schools have been hardly hit by enlistments for military service. The number of full-time medical instructors has declined 18.5%, and to this number others have been added since the Survey was completed.

With depleted staffs and an accelerated curriculum, which has well nigh obliterated holiday periods, our medical schools are carrying on under great difficulties. They are, however, continuing to graduate well trained men and women who are taking their places in the armed services.

It is doubtful if a further depletion of medical teachers should be made. Such would prove a serious handicap to the medical schools.

The Report recommends that satisfactory replacements should be found before any further withdrawals from the teaching staffs are made.

PART IV—PUBLIC HEALTH

The public health services of Canada,—Federal, Provincial and Municipal, were carefully examined and surveyed by experts in the public health field. The present personnel of the Federal, Provincial and local Health Departments, is to be considered as a wartime minimum if the measure of health protection which is now being given is to be maintained.

The staffs of the mental hospitals and the tuberculosis sanatoria have been depleted almost to the danger point. The reporting committee is satisfied that no further depletion can be made of the existing staffs without dangerously jeopardizing the welfare of the patients cared for in these institutions.

The Report then proceeds to outline in meticulous detail the present public health facilities across Canada and how the public health problems of Canada are being met.

PART V—HOSPITAL PERSONNEL AND FACILITIES

Canada's first hospital, the Hôtel-Dieu of Quebec, was opened 305 years ago. Canada now possesses 1,220 hospitals with 119,019 beds and cribs, and 6,766 bassinets.

Hospital beds per one thousand population vary from three per thousand in Prince Edward Island to 7.5 per thousand in British Columbia.

The percentage of population treated in hospitals in Canada in 1940 varied from 7.2% in Prince Edward Island to 12.9% in British Columbia.

The average stay in hospital in 1940 varied from 9.7 days in Prince Edward Island to 18.7 days in Quebec.

The cost of maintaining a person in hospital according to 1940 statistics varied from \$2.35 a day in Prince Edward Island to \$4.01 a day in British Columbia.

Hospital personnel has been very seriously depleted by the War. In addition to the enlistment of doctors and nurses, there has been a tremendous turnover of staff, amongst both skilled and semi-skilled workers. This has meant not only considerable disorganization but actually loss in efficiency of operation.

The Report shows the distribution of hospitals and then devotes considerable attention to the post-war hospitalization needs of Canada, having particular reference to the possibility of health insurance and how it would affect the hospital problem.

PART VI—INDUSTRIAL MEDICINE

This section of the Report presents a most illuminating picture, particularly of war industries, and the health facilities which they enjoy.

All war industries in Canada were studied, either by questionnaire or visitation or both. There are 1,155,307 male and female employees over fourteen years of age in manufacturing industry in Canada as at December 1, 1942.

There are 6,500 factories in Canada with fifteen or more employees.

The Report indicates those manufacturing establishments which employ either whole time or part time physicians and nurses. It also indicates those which do not do so.

Of the 404 physicians engaged in industry, 112 are devoting their full time to the service, 229 are devoting part time, while 63 perform some service on a fee basis.

Twenty-nine factories employing from 1,000 to 3,000 employees were found to be without physicians, full time or part time.

A careful examination of the Report will disclose the type of health supervision which is being given to the various industries in Canada and the needs for further health care in industry. The findings of the Survey emphasize that a great many employees do not receive the benefits of industrial medical care which they

would and should receive if there were a substantial increase in the number of physicians and nurses engaged in industrial medicine.

PART VII—WAR MEDICAL MANPOWER

This section of the Report was compiled by a Committee representing the four medical services,—Navy, Army, Air and Pensions and National Health, and two civilian physicians. There was placed at the disposal of the Committee full and complete information regarding medical aspects of all the services. The Committee visited military establishments from Halifax to Victoria. The Report consists of statistical and factual information, together with a large number of recommendations.

Effect has already been given to a great majority of the recommendations and it is worthy to note that the closest co-operation exists between the Services in their joint efforts, not only to carry on Canada's medical war effort in perfect harmony, but also to utilize the available medical manpower with the greatest economy.

PART VIII—NURSES

This section of the Report presents in much detail factual information regarding the distribution of the nurses of Canada.

The Survey was carried out by means of questionnaire and enquiries.

A registration of nurses conducted by National Selective Service included graduate and registered nurses, active and inactive, married and single. Nurses serving with the Armed Forces were not required to register.

Through the Survey an attempt has been made to explore all fields in which nurses are serving in Canada,—that is, in hospitals, public health agencies, the armed forces, private duty, and others.

The Survey showed that Canada possessed 52,483 nurses. Of this number, 8,306 had expressed their willingness to enlist. 24,909 were not available for military service, but there is a waiting list for the armed forces of 3,741.

Of the 52,483 graduate nurses registered, 45.5% are in Ontario, 14.9% in Quebec, 10.2% in the Maritime Provinces and 29.4% in the Western Provinces, including the Northwest Territories and the Yukon.

Of the total number registered, 22,136 nurses were employed as nurses. In addition 16,818 reported that they were available for full time, part time, or emergency nursing.

27,051 registered nurses, that is about 52% of the total registrants, stated that they were engaged in employment other than nursing. Of these 25,298 are housewives.

Of the total registration, 42,159 of the nurses reporting graduated in 1920 or since.

The report outlines the nursing problem from the selection and training of the nurse to the most effective utilization of her services.

PART IX—DENTAL SERVICES

As of February, 1943, there were 3,284 dentists in Canada attempting to serve approximately eleven million people, or at the ratio of one dentist to every 3,477 persons.

As of the same date, there were 1,019 dentists in the Canadian Dental Corps.

Dental manpower available for civilian services has been reduced by 21.4% since 1939.

It is considered that for the safety of the public, a 30% reduction is all that could be contemplated. This means that there are still 495 dentists in civil life who could be made available for the military services.

PART X—RECOMMENDATIONS

This section of the Report is a grouping of the recommendations put forward by all the study groups, by this method permitting of ready reference. It would be difficult to summarize recommendations, but some of the highlights are presented herewith:

THE FOLLOWING ELEVEN RECOMMENDATIONS ARE SUPPORTED BY THE CANADIAN MEDICAL ASSOCIATION

1. That freezing and moving of doctors for the duration of the war be controlled by the Canadian Medical Procurement and Assignment Board.
2. That provision be made whereby physicians called up under National Selective Service and those in low categories, be made available for service, either in the Armed Forces or in civilian life, on the recommendation of the Canadian Medical Procurement and Assignment Board.
3. That physicians called up by National Selective Service and found to be in low medical categories be re-examined by special military medical boards whose decision shall be final.
4. That doctors who are called up for service and who are found to be "C1" or "E" and therefore declared unfit for military service, be assigned to civilian duties replacing doctors who have entered military service.
5. That the Survey showing the distribution of all medical manpower in Canada be continued so that its valuable war and post-war information will be available.
6. That the Canadian Medical Procurement and Assignment Board be given the same powers with respect to the disposal of medical personnel as National Selective Service has for the disposal of other personnel.
7. That each Province be requested to grant interim licenses to practise to military doctors serving in that Province who may be called upon to render services to civilians.

8. That medical officers of the armed forces be encouraged and permitted to assist civilian medical practitioners whenever and wherever possible consistent with their military duties.
9. That provision be made for the replacement of doctors in rural areas when they are no longer able to carry on.
10. That movement of doctors from one locality to another be controlled.
11. That medical officers in the armed forces be relieved as far as possible of clerical and non-medical duties.

THE FOLLOWING THREE RECOMMENDATIONS ARE SUPPORTED BY THE DOMINION COUNCIL OF HEALTH

1. That the Canadian Medical Procurement and Assignment Board or, failing it, some other authority, be empowered to take such measures as will ensure the maintenance of the present minimum public health, mental hospital and tuberculosis sanatorium services.
2. That no further enlistments of public health personnel be made without the approval of the Provincial medical officer of health, or other responsible officer designated by the province.
3. That postgraduate courses of instruction in public health provided by universities in Canada for training of physicians, engineers and nurses, should be accelerated.

THE FOLLOWING ELEVEN RECOMMENDATIONS ARE SUPPORTED BY THE CANADIAN HOSPITAL COUNCIL

1. Regional wage levels should be set for classes of employees engaged in comparable work.
2. That hospitals paying these approved wages should be able to look to the National Selective Service for necessary staff.
3. That hospitals should be subsidized by the Federal Government where necessary to meet these standardized wage requirements.
4. That hospital strikes of any type should be declared illegal.
5. That hospital employees should be frozen to that type of employment for which they have been trained.
6. That all those seeking employment should possess a permit card.
7. Chronic absenteeism, not due to justifiable reasons, should be considered as an offense punishable by law.
8. That income tax should be deductible on a daily basis where that is basis of employment.
9. That a large percentage of women now engaged in non-essential activities should be transferred to essential activities.

10. That enlistments of highly trained hospital personnel should not be permitted without the approval of competent advisory authority.
11. That hospital workers should be provided with a badge or pin to show that they are civilians engaged in essential work.

There are a large number of other recommendations having to do with post-war hospitalization, all of which are worthy of careful study.

THE FOLLOWING SIX RECOMMENDATIONS ARE
SUPPORTED BY THE COMMITTEE ON INDUSTRIAL
MEDICINE OF THE CANADIAN MEDICAL
ASSOCIATION

1. That a decision should be reached as to whether employees of industries now without health supervision should receive supervision as provided for in Dominion Order-in-Council No. 1550.
2. That the Canadian Medical Procurement and Assignment Board be authorized to provide physicians and nurses as required to industry.
3. That great care be exercised in removing or replacing physicians engaged in industry, bearing in mind the great importance that health plays to industrial output.
4. That full time and part time physicians working in industries be provided with the necessary nurse assistance.
5. That provision be made for medical direction in factories where nurses are working alone.
6. That the part time services of physicians at the rate of one hour per week per one hundred employees and full-time services at the rate of one physician for 3,000 employees, at the factory be accepted as the standard for determining medical supervision in industry.

Other recommendations dealing with nursing and occupational hazards should be studied.

RECOMMENDATIONS REGARDING WAR MEDICAL
MANPOWER

Recommendations in this section of the Report arising out of the study of the medical services of the Navy, Army, Air and Pensions and National Health, number thirty-five. They are supported by the six members of the War Medical Survey Committee. All of the recommendations have been thoroughly studied by the medical services and by the Canadian Medical Procurement and Assignment Board, which Board is now satisfied with the implementations which as of this date (March 1, 1944) have been effected.

THE FOLLOWING TEN RECOMMENDATIONS ARE
SUPPORTED BY THE CANADIAN NURSES
ASSOCIATION

1. That under present conditions all nurses working for remuneration be required to remain in nursing and in Canada, subject to certain modifications already agreed upon through National Selective Service.
2. That effective use be made of the national registration by keeping this up to date. All new graduates and others not included in the initial registration should be required to register. Nurses who have already registered should be required to report change of address and status.
3. That better distribution of available nursing resources be effected. Professional registries have been established and supported almost entirely through the efforts of nurses themselves. In several Provinces efforts have been made to re-organize these registries as nursing service bureaux. Nursing bureaux provide an essential public service which justifies government aid.
4. That in order to effect a better distribution of nurses a committee of the Canadian Nurses Association be set up to function in connection with the procurement and assignment of nurses to meet the needs of the armed forces and civilian requirements for nursing service. Furthermore, that all matters concerning nurses and nursing which are brought to the attention of the Canadian Medical Procurement and Assignment Board be referred to the committee representing the Canadian Nurses Association. This Association stands ready to assist at all times in meeting the demands for nursing service and to advise regarding these.
5. That steps be taken to ensure all nurses receiving salaries that are commensurate with their responsibilities and that compare favourably with wartime salary scales.
6. That as much use as possible be made of nurses available for part-time duty. It will be noted that 84% of the nurses who have left the profession since December 31, 1939, have done so to be married. Many of these and other married nurses are returning to the profession, and give valuable service. Adjustments on part-time basis are frequently necessary.
7. That war aides and V.A.D.'s be employed in greater numbers in hospitals and communities to undertake appropriate non-nursing duties. It is economically sound and very essential to the quality of nursing service that nurses devote their time to duties that only the professional nurse can perform. At this time of keen competition for workers, special and effective measures to secure and maintain the neces-

sary subsidiary staff to support the nursing personnel in hospitals and other organizations should be put into effect with as little delay as possible.

8. That to overcome the present shortage every effort be made to encourage desirable young women to enter the nursing profession. The recruitment campaign carried out by the Canadian Nurses Association has been referred to already. The results are quite encouraging. However, satisfactory conditions in schools of nursing are essential. These include adequate facilities for learning and recreation, appropriate hours of duty and accommodation. Young women today can, and do, discriminate before selecting a career. Nursing is one of many fields in which they can serve.
9. That in areas where there is a shortage of nurses or an acute hospitalization problem, consideration be given by military and civilian authorities to the feasibility of pooling nursing resources.
10. That as part of post-war planning of nursing services, a continuation of government aid be maintained to assist in developing many special nursing activities that must play an important part in the rehabilitation programme.

THE FOLLOWING EIGHT RECOMMENDATIONS ARE
SUPPORTED BY THE CANADIAN DENTAL
ASSOCIATION

1. That a Procurement and Assignment Board for dentists and dental technical personnel be established.
2. That a National Health Board be set up for the purpose of formulating a national policy for Canadian health personnel and that membership on such Board be drawn from the various health agencies such as have co-operated in this Survey.
3. That for the duration of the War all dentists at present practising in Canada be fixed in their present locations and only allowed to change on the approval of the Provincial Dental Advisory Committee.
4. That as long as gasoline and rubber are available for essential services, special consideration be given to dentists.
5. That in the interests of civilian dental services cognizance be taken of the serious situation regarding dental supplies.
6. That dental technicians be classified as being employed in an essential war service.
7. That all enlistments of dentists and dental technical personnel whether voluntary or by call, be referred for recommendations to the respective Provincial Dental Advisory Committee, which Committee shall forward recommendation directly to the body concerned.

8. That dental personnel for civilian services be not reduced below 70% of the pre-war level and in any Province where this level has been reached no further dental enlistment be permitted.

CONCLUSION

As has been previously stated, it would be impossible to summarize adequately the Report of a Survey of this character, the magnitude of which can only be appreciated by reference to the Report as a whole.

While certain definite recommendations emerge, many if not all of which will be found to be of distinct value, the great value of the Survey and the Report lies in the factual information which has been made available to which reference is now being made and will continue to be made with great advantage in the post-war period.

APPENDIX

SUMMARY OF RECOMMENDATIONS OF WAR MEDICAL
MANPOWER, WITH COMMENTS BY THE SERVICES
AND REPORTED ACTION TAKEN

These recommendations were made by a Committee composed of,

Dr. A. E. Archer, representing Canadian Medical Association, Chairman.

Dr. Geo. Stephens, President, Canadian Hospital Council.

Representatives from each of the four Medical Services.

Recommendation 1.—Recommended tabulation by statistician and the information be made available to Inter-Departmental Committees concerned.

Action.—This has been done.

Recommendation 2.—That arrangements be made for the adequate handling of the more serious infectious diseases.

Action.—During the last year accommodation for infectious diseases has been considerably increased. It is now adequate.

Recommendation 3.—That a ratio of 3.5 to 3.7 doctors per thousand soldiers should provide ample room for all medical needs.

The Navy reports 4.9 M.O.'s per 1,000 personnel.
The Army reports 4.5 M.O.'s per 1,000 personnel.
The Air Force reports 3.66 M.O.'s per 1,000 personnel.

these figures as of March and April, 1943.

Action.—Ratio of medical officers to soldiers in the Army in Canada is high for the following reasons,—

(a) A very great volume of examinations done for National Selective Service and in selecting men for the Army in Reception Centres. In both England and the U.S.A. this is done by civilian doctors.

(b) Considerable numbers of medical officers are engaged full or part-time in work for the Department of Pensions and National Health.

(c) Included in these figures are all those officers under training as reinforcement officers and not available to provide medical services.

(d) Medical officers of the army do all medical examinations for the Civil Service throughout Canada.

(e) Army medical officers have done and are doing very large numbers of medical examinations of employees being released from certain industries.

(f) A certain number of medical officers are always employed on research work.

(g) Medical officers serving on the hospital ship also serve Navy, Army, Air Force, R.A.F., Royal Navy, and carry as well a considerable number of American patients.

(i) Large numbers of coal miners, farmers, fishermen, lumbermen and other personnel in war industries have been examined by army medical officers for National Selective Service.

(j) Very large numbers of men who are unfit for military service have been examined by army medical officers in order that they may be given a certificate of rejection for National Selective Service purposes. These include all the men rejected by Navy and Air Force who must also be rejected by the Army before being issued with a rejection slip.

(k) Army medical officers have examined very large numbers of men called up under N.R.M.A. The examination of many of these men is time-consuming and difficult because of the wealth of symptoms many of them produce. All these reported symptoms must be thoroughly investigated.

(l) Because men from sedentary occupations are introduced in the army to very active life, including night training, minor accidents and disabilities are very frequent. Because of the dangers of epidemics in bringing large numbers of men together from all over the country these men have had to be protected from certain diseases by vaccinations and inoculations. This necessity occupies much time of medical officers.

(m) Because of the multiplicity of employments in the army and the need to use every man most suitably disabilities have had to be evaluated closely and this has required many examinations by specialists.

(n) Because many men complain and often exaggerate minor symptoms in an effort to gain release from the army many re-examinations have to be undertaken, frequently by specialists.

(o) The accurate documentation that must be made, with very clear and detailed descriptions of all physical conditions as is essential to the work of the Board of Pension Commissioners, occupies considerable amount of the time of medical officers.

(p) Pools of medical officers must be maintained overseas to be available in the event of sudden casualties.

Medical boarding has been very greatly reduced during the last year. Men are given full medical boards now only on entrance to and discharge from the Army.

Recommendation 4.—Simplified organization and full utilization of medical officer personnel.

Action.—Every effort has been made to improve the organization of medical services and to effect every possible economy in the utilization of medical manpower; e.g., in many cases officers commanding hospitals are also employed in their specialty.

Recommendation 5.—Simplified transfer of medical officers out of Districts and across service lines.

Action.—Medical officers have been made much more mobile and are moved about by district medical officers much more freely. Reinforcement officers not yet sufficiently trained for overseas service are kept in a pool and allocated wherever the need is greatest. They are moved freely whenever necessary.

Recommendation 6.—Substitute non-commissioned officers for medical officers to do inoculations and refractions.

Action.—(a) The medical services do not agree that inoculations should be entrusted to anyone but qualified doctors because of the potential dangers in such procedures.

(b) Optometrists are used to the fullest possible extent. All available are employed in that capacity.

Recommendation 7.—Comparative study of methods of recruiting and reboarding in the three services.

Action.—These methods have been carefully compared by the three services. Their systems of examination vary because of the different conditions in each. It has been found necessary for men coming into the army to be examined by teams of specialists rather than by individual doctors.

Recommendation 8.—Use of medical officer personnel on staff of Department of Pensions and National Health hospitals.

Action.—Medical officers from all the three armed services are working in Department of Pensions and National Health hospitals all over Canada, and are assisting in every way possible to get the necessary work done.

Recommendation 9.—Consideration of whether the Department of Pensions and National Health should not gradually be relieved of some of its work in caring for active service personnel.

Action.—This has been done extensively by the armed services taking over certain numbers of beds in Department of Pensions and National Health hospitals for the care of active force personnel.

Recommendation 10.—Medical services to take over all service patients as facilities permit.

Action.—The active services handle their own sick and injured except where to do so would introduce duplication of services.

Recommendation 11.—Minor illnesses handled more expeditiously in unit hospitals or sick bays.

Action.—Small sick bays have been set up in many appropriate places and this method of care is now used extensively.

Recommendation 12.—Medical care in isolated areas provided by one service only.

Action.—The most extensive co-operation is now carried out in such isolated areas so that there is no duplication of medical manpower.

Recommendation 13.—Inter-service hospitalization should be encouraged.

Action.—A common hospital documentation which was previously lacking, has now been introduced in all four services. Inter-service hospitalization is now practised freely.

Recommendation 14.—Nurses most valuable in supervision; extended use of other rank personnel and V.A.D.'s.

Action.—(a) At present 94 V.A.D.'s are employed in army hospitals in Canada. It is expected that more may be taken on in the future.

(b) Classes are now under way for C.W.A.C. personnel qualifying as medical orderlies.

Recommendation 15.—The use of personnel of general hospitals being mobilized as active hospitals during the period of mobilization.

Action.—This suggestion has been found impractical. New hospitals being mobilized to go overseas are brought together only for the shortest necessary time before embarkation. All personnel are selected and allowed to continue in their employment until shortly before embarkation.

Recommendation 16.—Disposal of personnel with Field Ambulance units.

Action.—The number of Field Ambulances in Canada has been reduced. Medical officers of Field Ambulances are actively employed in training officers and other ranks and in providing medical services.

Recommendation 17.—Specialists with technical knowledge should not be diverted into administration.

Action.—Increased rank is now being provided for certain highly qualified specialist consultants. Every effort is made not to use specialists in administrative appointments unless such can be combined with technical duties.

Recommendation 18.—Non-medical administrative assistants might substitute for medical officers doing clerical work.

Action.—No medical officers do clerical work. Medical registrars of hospitals in Canada have all been replaced by non-medical registrars.

Recommendation 19.—Empty beds at Debert Military Hospital.

Action.—Debert Military Hospital provides a reserve of beds for possible need for returning casualties. Medical staff has been reduced to that appropriate to the actual bed occupancy.

Medical and surgical work is done for the Air Force in this hospital.

Recommendation 20.—(a) That the facilities of reception centres be utilized for examination of volunteers, N.R.M.A., recruits and revision cases.

Action.—Now being done.

Recommendation.—(b) That only eye, ear, nose and throat, psychiatric and radiological specialists be included on the slates of such reception centres.

Action.—This recommendation has been found not to be practical. All specialists have been made more mobile within the District and are moved freely to take care of any necessary work. This is necessary because of an over-all shortage of specialists in the services and the need to use them as economically as possible.

Recommendation.—(c) That the present system of chain examinations be discontinued and be replaced by a system whereby each recruit is given an examination in full and a general appraisal by a single medical officer.

Action.—There are not sufficient medical officers available who are capable of giving a really complete physical examination. Specialists work much faster and do better examinations. A general appraisal is not good enough, particularly for N.R.M.A. personnel. Detailed specialist examinations are necessary.

Recommendation.—(d) That the president of any reception centre be carefully selected and be empowered to locally approve of examinations.

Action.—This is now done except for boards on officers which are referred to N.D.H.Q.

Recommendation.—(e) That the medical officers of such centres be interchanged with hospital staffs at regular intervals of time.

Action.—This is done as extensively as possible.

Recommendation.—(f) That standing medical boards be eliminated, to be replaced when required by temporary boards to consist of any three medical officers. It is further recommended that one of these officers should act as president and hold field rank.

Action.—Standing medical boards are now almost all eliminated. The few remaining will be disbanded as reception centres take on their work.

Recommendation.—(g) That civilian doctors cease to be employed.

Action.—Employment of civilian doctors has been greatly reduced. It is still necessary to use a few in certain places.

Recommendation.—(h) That the sister services be requested to assist in the examination of N.R.M.A. recruits and Revision cases.

Action.—Navy and Air Force have no surplus officers available for this work. It is very special work requiring experienced medical officers.

Recommendation 21.—Inter-service conferences in districts urged.

Action.—This is being done. Monthly meetings are held.

Recommendation 22.—Utilization of only one doctor at a number of small flying stations.

Action.—R.C.A.F. report this is not feasible, as the actual presence of a medical officer on the station at all times when flying is under way is essential to the morale and safety of flying personnel.

Recommendation 23.—(a) Navy and Air Force might help examine recruits.

Action.—Navy and Air Force have no men available trained in this work. Such examinations require special qualifications and experience in all the manifestations of exaggeration of symptoms and malingering.

Recommendation.—(b) That no recruit be medically examined until the problem of his claim to deferment has been settled.

Action.—Large numbers of men are still being examined who will be deferred, as National Selective Service wants to know which of these men can be called if needed.

Recommendation 24.—(a) There should be suitable basic training courses with a definite curriculum for all medical officers in each of the Services.

Action.—All doctors entering the Army now take basic training at the Officers Training Centre before continuing their medical training.

Recommendation.—(b) Further training in battle first aid technique necessary.

Action.—Teaching of battle first aid has been very considerably extended.

Recommendation.—(c) Suitable housing conditions should be supplied in which reasonable facilities for study are provided.

Action.—Housing conditions and study facilities at Camp Borden are now adequate.

Recommendation 25.—Thought should be given to providing methods for training some young medical officers in certain specialties.

Action.—Extensive specialist training has been undertaken and is now going on in all branches of medicine which suffer from shortages.

Recommendation 26.—Utilization of women medical officers for women personnel.

Action.—Every suitable women doctor who volunteers is accepted. More are needed.

Recommendation 27.—Priority for medical services to secure women hospital assistants.

Action.—A course for training C.W.A.C. personnel as medical orderlies is now under way. Others will follow.

Recommendation 28.—Full consultation necessary re hospital construction.

Action.—Under the Wartime Committee on Hospitalization, engineer and architect services are used to produce standard designs for the three services, which are adjusted to local conditions.

Recommendation 29.—Interchange of information and results of research findings by the various services.

Action.—All research projects, progress and results are cleared with all the services. A Medical Intelligence Division has been set up in which all three services participate.

Recommendation 30.—Laboratory developments need co-ordination and supervision. Facilities of Provincial laboratories should be fully investigated in planning future laboratory services.

Action.—Provincial laboratories are now being used very extensively. Every co-operation in the supply of personnel and equipment is extended.

Recommendation 31.—Simplify as well as unify medical hospital documentation.

Action.—All such documentation has now been made uniform for the four Services. They have been simplified as much as possible consistent with efficiency.

Recommendation 32.—Study of medical services of other countries.

Action.—Complete information has been made available about British and American medical organization, and to some extent that of Russia.

Recommendation 33.—Uniform rank in all medical services advisable on commissioning.

Action.—No action has been taken.

Recommendation 34.—(a) Statement of policy of dealing with evacuated casualties urgently needed to plan and provide hospital and personnel distribution.

Action.—The policy is to keep overseas for treatment only those men who will be returned to duty within six months. Others are returned to Canada as soon as they can be transported safely.

Recommendation.—(b) Concentration of casualties according to their home or enlistment area.

Action.—This is done.

Recommendation.—(c) Concentration of casualties according to type of injury, disease or type of treatment required.

Action.—Special treatment centres are being set up by the four services to undertake special work such as neurosurgery, orthopaedics and plastic surgery.

Recommendation.—(d) Provision for the handling of cases requiring prolonged or permanent care, but not active hospitals.

Action.—This provision is being undertaken by the Department of Pensions and National Health, under whom such cases come.

Recommendation 35.—Creation by Order-in-Council of a medical services board.

Action.—The present system of liaison and common action on the part of the four medical services works satisfactorily. It has been recommended that at the end of the war the whole question of medical organization be reviewed. At present, common planning has been undertaken in regard to hospitals, supplies, personnel, research, specialist services, convalescence and casualty retraining, evacuation of casualties by hospital ship, ambulance trains and treatment in special treatment centres, and every other matter which affects the medical services. The Directors of the Medical Services are now performing the function of the recommended Board.

Retrospect

DIPHTHERIA:—A PROBLEM OF THE FUTURE*

By Donald S. Fleming, M.D., D.P.H.

Montreal

The attention that bacteriologists are paying at present to diphtheria would appear to have some significance for those who work in the clinical fields of medicine. For that reason a discussion of the problem presented by diphtheria, particularly as it would appear likely to be influenced by the war, would seem to be opportune.

Since the isolation of the causative agent of diphtheria half a century ago by Klebs, our knowledge of the disease has grown very rapidly. It is one in which the whole medical profession—clinicians, public health officials, and laboratory workers—have collaborated with very successful results. We know the causative agent of the disease, the diphtheria bacillus. We know the mode of action of the micro-organism in the body—the production of a lesion which, except for the occasional spread of the membrane into the larynx and trachea, presents the important feature that the bacteria remain localized and secrete a toxin which is carried by the blood and lymph to distant vital organs. In diphtheria antitoxin we possess an efficient therapeutic agent and the means of conferring a temporary passive immunity on exposed susceptibles. We can actively immunize against the disease with a number of agents, using diphtheria toxoid, either fluid toxoid or alum-precipitated toxoid, or the older toxin-antitoxin mixture. To complete this picture, we have in the Schick test a means of detecting susceptible individuals and also a means of

proving whether or not a course of active immunization has been successful.

All in all, this would seem to be a very complete picture of any disease, and as far as investigative work is concerned there is apparently little of importance left to be done beyond such details as the improvement of diagnostic methods by the development of better growth media; the production of even more potent antitoxin in smaller volumes, and the removal of undesirable elements from antitoxic sera; the evaluation of methods of immunization as to the methods of administration; the spacing and dosage of toxoid, and the production of even more efficient immunizing agents.

It would seem that, if we used the information at our disposal, diphtheria could be relegated to a position of very minor importance and that, like smallpox, it would become a disease that the medical student hears about but never sees, as no cases are available for teaching purposes. As a matter of fact, in Montreal we have seen a decrease in the number of reported cases of diphtheria from 1,826 in 1927 to 134 in 1940—a more than 90% reduction—and other cities have done even better than this.

If this is the present status of diphtheria in this country, is there any reason to suppose that this satisfactory progress will not be maintained and that diphtheria will once more become a disease of major significance. Recent work in diphtheria would seem to indicate that this disease is very likely to become more important in Canada in the future, and it is for this reason that the present interest in diphtheria is justified and why it should be discussed at this time.

PREVALENCE OF MALIGNANT DIPHTHERIA

Diphtheria, like other diseases, has apparently varied in severity from time to time in the past; although previous lack of exact methods of diagnosis makes this difficult to gauge accurately. However, since 1875 the reduction in diphtheria mortality has been striking.

For example, in 1927, Doering made a survey of diphtheria mortality in Massachusetts. He showed that in 1875-85 the rate was between 0.8 to 2.0 per 1,000 population and in 1915-25 it was between 0.08 to 0.016 per 1,000 population—a ten-fold decrease in mortality. Similarly in Denmark, Hecksher in 1925, in a survey of diphtheria mortality in hospital practice for the period of 1921-25, found a case fatality rate of 1.2%.

The first evidence that all was not well in the diphtheria situation came in 1927. At that time Deicher and Agulnik reported on the diphtheria mortality rate in a Berlin hospital. This had risen from 5% in 1924 to 26.7% for the first five months of 1927. There was a corresponding, but less marked, increase in diphtheria deaths for Berlin as a whole. At this time they noted that many of these cases did not respond to serum therapy. They also

*A paper read before the Osler Reporting Society, Montreal, January 28, 1944.

observed that the disease had changed from one causing few deaths, except in infants and small children, to one in which deaths were equally frequent in children over five years of age. A further change was the fact that the more dangerous disease was not a pharyngeal and nasal diphtheria, croupous cases being rare. During the next few years severe epidemics of diphtheria were reported from many parts of Europe—France, Czechoslovakia, Italy, and Roumania.

However, the present-day interest in diphtheria really began when this severe form of the disease reached England. In 1931 a group of workers at Leeds¹ not only reported a severe outbreak of diphtheria in that city, but also attempted to correlate the cultural characteristics of the organism isolated with the type of disease produced.

Up to this time the only division of diphtheria bacilli had been into two groups—virulent and avirulent organisms. This attempt of the Leeds workers to relate laboratory characteristics to the kind of disease produced in the patient created much interest. Since that time many papers have appeared, dealing both with outbreaks of diphtheria and the identification of strains or types of the infecting organism on the basis of the criteria set forth by McLeod and his co-workers at Leeds. We will return later to the bacteriology of diphtheria, but, first, we will consider this new form of diphtheria that has appeared.

CHARACTERISTICS OF MALIGNANT DIPHTHERIA

This severe type of diphtheria which is of concern at the present time has been given a number of names such as "malignant," "grave," and "hypertoxic" diphtheria.

The malignant type of disease is characterized by a sudden and severe onset with evidence of severe toxæmia that is manifest in the fact that, in Manchester² for example, the majority of deaths in this type of disease occurred within four days.

Swelling of the neck, to give a "bull-neck" appearance, is common as a result of involvement of the cervical lymph glands and surrounding tissues. There is usually marked œdema of the pharynx. The amount of membrane formed appears to vary a great deal. In the Halifax outbreak of 1940³ the membrane was extensive; but, in general, the membrane is not so extensive as in less seriously ill patients, though the region primarily involved may be penetrated deeply by the lesion. Involvement of the nasal passages, with bleeding from the nose is frequent.

The most striking characteristic of this severe type of diphtheria is the fact that it is refractory to serum therapy. In spite of anti-toxin being given early and in adequate dosage, such as 130,000 units, the case mortality rate is not reduced as one would expect on the basis of earlier experiences with this disease, and the

patient dies with evidence of toxic effects on the viscera, particularly the heart and kidneys.

One other striking fact has been the change in the age groups affected. Instead of the disease being one of infancy and early childhood, there has been a very definite shift to older age groups. Thus, to take the Halifax outbreak³ as an example, we find that 69.2% of all cases were in persons over fourteen years of age and, when service personnel are excluded, the percentage is still 53.4% in this older group. With this shift in age incidence we now see the highest morbidity in the older groups; but the highest mortality still occurs in childhood, though this is not as strongly in evidence as before.

BACTERIOLOGY OF DIPHTHERIA

The workers at Leeds, besides reporting a severe outbreak of diphtheria in that city in 1929-30, also attempted to correlate the clinical type of disease with the cultural characteristics of the infecting organism. By the use of a special medium devised by McLeod, and known as tellurite chocolate agar, they were able to demonstrate distinctly different types of colony formation. A strain isolated in this way could also be distinguished by other characteristics, such as the type of growth in broth, hæmolytic action and the ability to ferment starch and glycogen.

On this basis the Leeds group divided diphtheria bacilli into three types—*gravis*, *mitis* and *intermediate*. It was their impression that the *gravis* type of organism was associated with the severer cases and that paralyzes were common amongst them. On the other hand, the *mitis* type was associated with milder cases and paralyzes were rare. In their other group of cases the intermediate forms were uncommon, but tended to approach the *gravis* type in clinical severity. Thus in 104 cases they found the following distribution: *gravis* types were isolated from 63 patients and among these were 11 deaths and 14 cases of paralysis; intermediate types from 6 patients with no deaths; and 3 cases of paralysis; *mitis* types, from 35 patients, with no deaths or paralysis.

When these Leeds workers thus attempted to correlate clinical disease and cultural characteristics they felt that they were expressing general tendencies and not rigid rules. It was the impression of one of these authors that mild cases due to either *gravis* or *mitis* forms of the bacillus were indistinguishable; but that the more severe cases, if observed throughout the illness, are clinically distinct.

This work at Leeds aroused great interest among bacteriologists and in the twelve years that have passed since this original report many papers have appeared. Some of these papers, particularly those from Manchester in 1934², from Dundee in 1935,⁴ and from the Ukraine, in 1939⁵, supported the views of the Leeds group. Other workers felt that the conclusions

as to the relationship between the gravis type and malignant diphtheria were not justified. For example, Frobisher,⁶ in a study of strains of diphtheria bacilli in various parts of the United States, published in 1940, stated that numerous strains culturally typical of the gravis type were avirulent in laboratory tests and that patients with mild diphtheria, as well as carriers, were found to harbour organisms of the gravis type. Outbreaks were also reported in which the majority of severe and fatal cases were said to have the cultural characters of mitis or intermediate types.

However it has been difficult to properly assess these varied reports. Most of the workers have not used exactly the same criteria as were used at Leeds. Thus, when Frobisher⁷ examined 237 cultures obtained in Baltimore, using these different criteria of different authors, he found that the percentage of gravis strains varied from 1.7 to 18.1%.

On the whole, however, it would seem fair to say that the types of diphtheria bacilli described by the Leeds workers do exist and, when the criteria laid down by them are followed, it is possible in the vast majority of instances to place the organism in one of the three types. In the Ukraine⁵ it was found that only 1.2% were atypical; in Glasgow,⁸ 1%; and in Manchester² 2.4% gave anomalous results.

At one time some question was raised as to whether or not these types of diphtheria bacilli were stable. In Edinburgh, Christison⁹ found that the three main types undergo variation in colony structure after growth in bouillon, but their differentiation on the basis of starch fermentation is still possible. The weight of evidence would seem to indicate stability of type, and the Leeds group reported that the strains isolated remained constant in their characteristics for periods up to at least eight months. A number of workers, reported in a paper by McLeod,¹⁰ showed also that there is stability of type when the organism is injected into the animal body (using the guinea pig, rabbit, mouse and rat) and recovered at a later date. In the human subject this question of stability of type is more difficult to determine, but the evidence appears to support stability of type and suggests that any changes of type on subsequent cultures during the course of an illness are due to cross-infection.

THE PROBLEMS PRESENTED

At this point we might pause to consider what problems have been raised by these investigations of malignant diphtheria. These problems are three in number: (1) Are the cultural characteristics of the diphtheria bacillus, and the clinical disease produced by it, related to one another? (2) Is the toxin produced by all strains of diphtheria bacilli the same? (3) Does immunization protect against all strains of diphtheria bacilli?

RELATION OF CULTURAL AND CLINICAL CHARACTERISTICS

As already indicated, there is considerable controversy as to the justification for linking cultural characteristics of the diphtheria bacillus to the type of disease produced. However, in a general way this relationship seems justified by the evidence at hand.

Certainly, in those areas of the world where gravis strains are prevalent, as in Europe, the type of disease produced by the gravis type is more severe (with a case mortality rate around 13%) than that seen in those patients with mitis type infection (where the case mortality rate is 1% or less). On the other hand, when gravis type infection is not present and the disease is mild, as was the case in the Glasgow outbreak of 1933⁸ its place is largely taken by the intermediate type which is less virulent (as shown by a case mortality rate of 7.8%) but which causes paralyses and albuminuria to about the same extent as gravis when the latter is the chief infecting type.

As yet, only one large outbreak of diphtheria due to the gravis type of organism has been recorded on this continent. This was the Halifax outbreak of 1940-41¹¹ in which there were 649 cases and 24 deaths, giving a case mortality rate of 3.7%. These Halifax cases resembled mitis infections in that there was a high incidence of laryngeal diphtheria and the deaths were fewer than in most recorded outbreaks of gravis diphtheria.

TOXIN PRODUCTION BY DIPHTHERIA TYPES

A striking feature of infections due to the different types of diphtheria bacilli has been in the differences of response to serum therapy. Thus, gravis infections tend to be refractory to antitoxin and toxic complications are frequent. In mitis infections the response to serum is good and evidence of toxæmia is not so marked. When intermediate types are the predominant organisms, the response to antitoxin is an average of these two extremes.

These differences in response to antitoxin naturally suggested that different types of diphtheria might well secrete different toxins. However all work reported to date shows that the toxins produced by all strains of diphtheria bacilli are qualitatively identical.

In Dublin, O'Meara in 1940¹² carried out experiments that convinced him that diphtheria toxin has two components, substance A and substance B. He found that toxin from Park-Williams No. 8 strain has a high proportion of substance A relative to substance B, and that the reverse is the case with the toxins produced by gravis strains. Therefore he feels that, while all diphtheria toxin is the same, the components forming it can differ in their relative proportions and that it is possible that the antitoxin formed in response to such toxin also differs in the relative amounts of antibody

present. This view-point of O'Meara does not seem to have received any general support.

On the other hand Povitzky, Eisner and Jackson¹³ have shown that toxins of gravis, mitis and Park-Williams No. 8 strains are neutralized unit for unit by Park-Williams No. 8 antitoxin. Zinnemann and Zinnemann⁵ have shown that the usual fluid or alum-precipitated toxoids will protect guinea pigs against the toxins produced by gravis types. They also found that the antiserum, produced by immunizing a horse with the toxin secreted by a gravis strain, is not superior to the usual commercial antitoxin in protecting guinea pigs against gravis type toxin or gravis type infections.

Since the evidence supports the identity in quality of all diphtheria toxins, the difference produced in the body by the various types must rest on some quantitative aspect of toxin production. In this respect it is of interest that mitis strains have generally been said to produce more toxins *in vitro* than gravis strains. However, this does not appear to be of significance, as there is little correlation between toxigenicity *in vitro* and virulence.

Some work of Mueller at Harvard in 1941^{14, 15} throws some light on the problem of toxin production. He showed that the abundant formation of diphtheria toxin occurs only in a relatively narrow zone of concentration of iron. He attempted to determine the amount of iron present in the membrane of a severe case of diphtheria, and, while this cannot be established with accuracy, he was able to show that there is a plentiful supply of iron. This quantity of iron is not sufficient to prevent toxin formation, but it does result in a relatively low level of toxin production. He then showed that non-gravis types were able to produce a toxin of approximately 3 mld/c.c. under these conditions, whereas a gravis type produced a toxin of 40 mld/c.c. Mueller felt that a difference of this order, thirteenfold, was likely sufficient to explain the observed variations in the course of the disease.

One other fact that may help explain the apparently greater toxigenic ability of gravis strains in the body is the fact that these strains seem to be more invasive than other strains of diphtheria bacilli. Thus Robinson and Marshall² in Manchester report that the gravis and intermediate types appear to possess a greater virulence than mitis, as judged by their power to invade and persist in the tissues of the animal body following subcutaneous injection in guinea pigs and subsequent recovery of the organism from the local lesion, liver, pleural fluid and heart's blood after death of the animal. McLeod, Orr and Woodcock¹⁶ in reporting autopsy findings in fatal cases of diphtheria were unable to show the spread of the bacillus to other parts of the body, but were able to show deep infection of the lung with gravis

types and to a lesser extent with intermediate strains.

IMMUNIZATION AND MALIGNANT DIPHTHERIA

With the development of toxin-antitoxin and then, later, of toxoid, it was felt that an efficient means of active immunization against diphtheria was readily available. As an added factor of assurance the Schick test provided a means to measure individual response to the immunization process and thus prevent the development of a false sense of security in regard to the patient who does not respond as well as the average person.

When animal experiments were carried out it was found that the usual commercial toxoid would protect against infection and the toxins produced by the different types of diphtheria bacilli. This is the result that one would expect if it is true that all diphtheria bacilli secrete the same kind of toxin. However, experience with human population groups has not presented the same definite picture. The Schick test, when used as a measurement of immunity status, is believed to give a negative reaction when the individual tested possesses 1/250 unit or more of antitoxin per c.c. of serum, and experience in the past has been that such persons are immune to diphtheria. In the Manchester outbreak reported in 1934² it was found that gravis and intermediate types will cause clinical diphtheria in Schick-negative individuals. In this series of cases there was no evidence of a mitis strain infecting a Schick-negative. To be more specific; in a series of 466 cases of diphtheria, 12 patients were known to be Schick-negative immediately prior to the onset of disease; 8 of the cases were due to gravis type infection; 4 to intermediate. These cases were as a group milder than those in the general population. The patients making up this group of cases ranged in age from 5 months to 25 years and included individuals having passive immunity from the mother and active immunity from both sub-clinical exposures and artificial immunization.

In the Ukraine epidemic reported in 1939⁵, 83 of 254 cases, or 32.7%, occurred in children with a history of active immunization. In this instance the process of immunization was likely to have been inadequate in many instances, for when a group of children of this area were Schick-tested in 1936 after receiving a single injection of alum precipitated toxoid in 1934-35, 40% of these "immunized" children were found to be Schick-positive.

In the Halifax outbreak of 1940-41,³ it is reported that 66 of a total of 891 cases had at least some degree of immunity, in that 15, or 1.6%, were Schick-negative, 46 had had incomplete toxoid immunization, and 5 had had diphtheria antitoxin within a two-months' period.

While these reports are not in any sense conclusive, they do cast doubt on the widely-

held belief that the production of a Schick-negative state by artificial active immunization or sub-clinical infection is a guarantee of protection against diphtheria. At the same time it does seem true that the disease is as a rule less severe in those persons with a history of some immunity than in the definitely non-immune population.

THE PROBLEM OF THE FUTURE

At this point we might raise the question as to what will be the likely nature of diphtheria in Canada in the future, and what can be done to meet the challenge if one exists.

There is no doubt that the nature of diphtheria has changed in Europe in the past twenty years. As yet this new type of disease has hardly appeared on this continent, but that it will do so seems inevitable. Those who investigated the Halifax epidemic state definitely that it was of a gravis type and Wheeler and Morton,¹¹ in discussing this point, feel that the disease was likely brought to the port by the crew of a Norwegian tanker. Frobisher,⁶ in reporting the strains of diphtheria bacilli found in various parts of the United States, notes that although gravis strains were found in only one area of five in 1937-38 (10% of Alabama cultures), in 1938-39 they were found in four out of five areas. Thus although gravis-type diphtheria has not yet become a serious cause of disease on this continent, the organism is definitely here and, with the return of hundreds of thousands of servicemen and women from those areas of Europe where the disease has been most severe, this introduction of the most virulent strains will be particularly heavy at the end of the war.

Since malignant diphtheria may be expected, what can be done to prevent it or reduce its effect to a minimum?

The value of serum therapy is not so great with these patients as could be wished, therefore preventive measures become of even greater importance than at present, if that is possible. Although some doubt has been cast upon the efficacy of active immunization in protecting the individual, it would seem most likely that failures in this respect are due to the production of a low-grade immunity which gives a Schick-negative response, but does not confer real protection. Therefore active immunization with fluid toxoid in three subcutaneous injections at intervals of three weeks would seem to be the method of choice. The single injection of alum-precipitated toxoid is unreliable, and Wishart¹⁷, of Toronto, has recently shown that intradermal administration of toxoid is not an effective method of primary immunization. In any event, Schick-testing after immunization is the only means available to show that some degree of immunity has been conferred.

In the past it has been felt that if infants were immunized at nine months of age and

received a reinforcing dose prior to entering school that diphtheria could be controlled. It was felt that repeated sub-clinical infections would serve to maintain or develop active immunity in the adult population, and that all organized effort should be devoted to the child population. The recent outbreaks of severe diphtheria have shown a distinct change from the expected age-grouping of cases, for the adult cases have become more numerous than those of children. This is, no doubt, due to two factors. In the first place many areas have immunized a high proportion of the child population. In the second place the supposed existence of immunity in the adult population is not nearly so great as had been commonly believed. For example, Wishart¹⁷ in 1943 found that 52.7% of a group of University of Toronto students were Schick-positive; in Nova Scotia in 1940 Campbell¹⁸ found that the Schick-positives ranged from 47% among R.C.A.F. personnel to 87% of 558 adults selected at random from a town of 3,600 population; in Halifax³ it was felt that about 80% of adults were Schick-positive at the time of the outbreak.

This lack of the expected immunity of adults to diphtheria shows that emphasis in diphtheria immunization must be turned to this group as well as being maintained among children. It is true that immunization among adults may be more difficult than among children, due to sensitivity to the antigen, but if a Schick test and a control are carried out prior to immunization this sensitivity can be detected and a suitably diluted toxoid employed. No doubt further work on the use of reinforcing injections will be carried out and in this connection the use of intradermal inoculations may prove of value when properly spaced.

The control of diphtheria can only result from a joint effort on the part of physicians and public. For his part the physician must appreciate the necessity of immunization for adults as well as children and the use of the Schick test as a means of establishing the immunity status both prior to and after immunization. The severity of the disease must receive proper recognition, and this means that an early diagnosis must be made and adequate doses of antitoxin administered. Some writers have suggested that in the severe cases there may be an associated infection with hæmolytic streptococci. If the laboratory report indicates the presence of such organisms along with diphtheria bacilli, the use of chemotherapeutic agents along with antitoxin would appear to be indicated. Finally, the physician must be prepared to do this work of immunization as part of his regular practice, if not, he must be prepared to support efforts made by the public health authorities to achieve it in other ways.

On the part of the public there must be a realization, through education by physicians and the authorities, of the necessity for active

immunization of their children and possibly of themselves. They must be taught the necessity of a physician seeing a patient early in the disease when there is any possibility that the affected individual has diphtheria. With the achievement of a good immunity status among the majority of the population, diphtheria should cease to be the problem for this country that it is at the present time, and which it promises to be in the future.

REFERENCES

1. ANDERSON, J. S., HAPPOLD, F. C., MCLEOD, J. W. AND THOMSON, J. G.: *J. Path. & Bact.*, 1931, 34: 667.
2. ROBINSON, J. T. AND MARSHALL, F. N.: *J. Path. & Bact.*, 1934, 38: 73.
3. MORTON, A. R.: *Canad. M. Ass. J.*, 1941, 45: 171.
4. MURRAY, F. F.: *J. Path. & Bact.*, 1935, 41: 97.
5. ZINNEMANN, K. AND ZINNEMANN, I.: *J. Path. & Bact.*, 1939, 48: 155.
6. FROBISHER, M., JR.: *Am. J. Pub. Health*, 1940, 30: 28 (Supplement).
7. *Idem*: *Am. J. Hyg.*, 1938, 28: 13.
8. CARTER: *J. Hyg.*, 1933, 33: 542.
9. CHRISTISON, M. H.: *J. Path. & Bact.*, 1933, 37: 243.
10. MCLEOD, J. J. R.: *Bact. Rev.*, 1943, 7: 1.
11. WHEELER, S. M. AND MORTON, A. R.: *Am. J. Pub. Health*, 1942, 32: 947.
12. O'MEARA, R. A. Q.: *J. Path. & Bact.*, 1940, 51: 317.
13. POVITZKY, O. R., EISNER, M. AND JACKSON, E.: *J. Inf. Dis.*, 1933, 52: 246.
14. MUELLER, J. H. M.: *J. Immunol.*, 1941, 42: 343.
15. *Idem*: *J. Immunol.*, 1941, 42: 353.
16. MCLEOD, J. W., ORR, J. W. AND WOODCOCK, H. E. C.: *J. Path. & Bact.*, 1939, 48: 99.
17. WISHART, F. O.: *Canad. J. Pub. Health*, 1943, 34: 509.
18. CAMPBELL, P. S.: *Canad. J. Pub. Health*, 1941, 32: 404.

3775 University St.

Men and Books

LEDOYEN AND HIS DISINFECTANT

An Episode in the History of Typhus Fever in Quebec

By Gabriel Nadeau, M.D.

Rutland, Mass.

[The original of this article appeared in full in "L'Union Médicale du Canada," 1943, 73: 52, to whom we are indebted for permission to republish it in translation. We regret that lack of space has made it necessary to omit some of Dr. Nadeau's interesting material.—EDITOR.]

"The year 1847 was one of the darkest periods in the history of our good city of Montreal." It is in these words that an anonymous writer describes the ravages of typhus in Montreal a century ago.¹ If things were gloomy in Montreal, they were no less so in other cities visited by this plague.

Cholera had decimated the population of Canada in 1831 and 1832 and, again, two years after that. Now, 13 years later typhus broke out. At the height of the epidemic, on July 19, 1847, the Colonial Secretary, Earl Grey, wrote to Lord Elgin, Governor-General of Canada, as follows: "I am in hopes that I shall be able to send you out by the packet the inventor of the 'disinfecting fluid' of wh. you have probably heard.—The reports of its efficacy in destroying infection are really wonderful & its use in the

quarantine stations & hospitals in Canada will I trust be attended with great advantage."²

What was this wonderful disinfectant and who invented it? Let us begin with the second question. The inventor was Jean Ledoyen and his activities, though long forgotten, form a curious chapter in our medical history.

LEDOYEN IN FRANCE

We know little of Ledoyen's origin, except that he was born in France. He was a chemist, not a doctor, and we only know that he belonged to the "Society for the Encouragement of National Industry". He appears in public life first in 1844, when he began to advertise the virtues of a disinfectant of his own invention. Within four years his anxiety to pass on the benefits of this discovery to the human race led him to England, to Ireland, to Canada and to the United States. Was this solicitude entirely altruistic? Probably not. The Ledoyen solution seems to have been able to do everything. It was an antiseptic, a "deodorisant", a cure for cholera, and also for typhus. It healed sores and it enriched the soil. The formula was not complicated, although Ledoyen would not divulge it. It contained only one ingredient.

From the very beginning Ledoyen managed to attract the interest of the French Government as well as of some scientific public bodies. Many experiments were carried on with his fluid, all of them in public, and the accounts of them have all been preserved. The first of these was held in December, 1844, on the order of the Government, in the office of one of the ministers at 101, rue de Grenelle (Paris). It was concerned—don't laugh—with the disinfection of a cesspool! Two commissions of doctors and chemists were present, one chosen by the Prefect of Police and the other by "The Society for the Encouragement of National Industry" of which Ledoyen was a member. It is said that everyone was satisfied with the results and Ledoyen was then asked to carry out further experiments before "The Committee of Agriculture of Seine-et-Oise" and the Council of Versailles. These experiments were prolonged throughout the following year and into 1846. The names of those who were deputed to watch them are all on record, and as they include prominent men of the day in medicine and chemistry, we may assume that Ledoyen was being taken seriously. We cannot think he was only what we would now call a "promoter"!

The report on the experiments was duly sent to the Government. It is too long to give in detail, and it will be enough to say that the cesspools were duly disinfected, or, more accurately, deodorized, and that earth which had been mixed with dung or decomposing organic material not only was disinfected by the fluid but became endowed with marvellous growing properties, producing luxurious crops of vegetables of various kinds. As a final touch, five-

franc pieces soaked in fecal matter, that had been watered with the fluid, did not tarnish!

More tests were carried out in February 1846, this time at Val-de-Grâce. The air in hospital wards and dissecting rooms was purified. Cancerous sores were treated. A tumour which, after surgical removal, had been left lying to decompose in water for three months was plunged into the Ledoyen fluid. It at once became hard and was preserved for another 6 months. The cesspools were not overlooked and the same success with them as before was recorded. These results were attested by a certificate given to Ledoyen by Dr. Lacouchie, professor of anatomy at Val-de-Grâce.

Later in that year other experiments were carried out at the Charité of Paris. The odour from one case of incurable disease was becoming intolerable in the ward. Towels soaked in Ledoyen's solution and placed on each side of the patient at once removed all the evil odour. Unfortunately the patient died four days later, just as the towels were going to be changed. Ledoyen also obtained certificates of all the remarkable qualities of his solution from a Dr. Robert, two of whose cases he had treated successfully, one a discharging sinus of the chest and the other an infected tumour of the face.

Finally, in September 1846, eleven people were suffocated by gases in a cellar in Paris. Ledoyen was summoned and arrived in time to restore them all to life. After that he purified the air of the cellar.

IN ENGLAND AND IRELAND

At the close of 1846 Ledoyen went to London. Why he left France is difficult to say. He certainly lacked no official support there and he seems to have had no enemies. At any rate, armed with seven certificates which he intended to make the very best use of, he set out for England. There he associated himself with Colonel A. E. Calvert whom we shall see later on in Canada. Calvert was no more a doctor than was Ledoyen. His son, however, taught chemistry at the Royal Institute of Manchester.

Ledoyen soon began to make approaches to the British Government, addressing himself at first to Lord Morpeth, First Commissioner of Her Majesty's Woods and Forests, and later to Earl Grey, Secretary of State.

Ledoyen's following self-introduction made full use of his work in France:

"M. Ledoyen, chemist of Paris, has discovered the means of disinfecting all fetid animal substances and gases by a liquid which is very cheap, simple, and can be applied by any person with the greatest facility. It disinfects night-soil, not destroying but increasing vegetation, more particularly as regards agriculture, completely preventing the disease in potatoes, when the land is manured with disinfected night-soil. It disinfects hospital-wards of miasma, also cellars, water-closets, and buildings infected by impure gases. It disinfects sailors suffering from fever on board of vessels; it will also disinfect ships at sea and under quarantine. It disinfects patients suffering with infectious disorders and wounds, also dead bodies, so that

they may be kept nearly a month; also different parts of the body can be kept for the purpose of dissection, for coroner's inquests, &c.

"M. Ledoyen has with him a Report from a Commission, composed of the first chemists and agriculturists, ordered by the French Government, and transmitted to the Society of Arts for the Encouragement of National Industry at Paris, which contains a series of agricultural experiments made in the years 1845 and 1846, showing the immense advantage of using the disinfected night-soil in agriculture. This Report shows that the process enables the night-soil to be removed from privies at any time of the day. M. Ledoyen has many certificates from physicians and surgeons of different hospitals at Paris, certifying to the efficacy of the process of disinfecting dead bodies, wounds &c.; and also from the Minister of War, ordering M. Ledoyen to disinfect all military hospitals, barracks, &c. This process is most effectual as a sanatory remedy for towns, &c. M. Ledoyen wishes to place this discovery in the hands of this British Government; that they may give it their authority, and publish it to the country, after having tested its merits by any experiments that the Government may think proper to order, which experiments will be made at the cost of Monsieur Ledoyen."

Apparently he had no trouble in gaining a hearing, as he soon began to repeat his experiments, the only difference being that they were on a much more extended scale. The most detailed report is that by Dr. T. S. Smith with R. D. Grainger and Joseph Toynbee. These three men made exhaustive tests of Ledoyen's fluid and the conclusions of their lengthy report are as follows:

"1. That this fluid does not possess any peculiar power in preserving the dead body from decomposition, and that, therefore, it is not applicable to any considerable extent to purpose of dissection.

2. That it removes the factor of putrefying substances, vegetable and animal, by decomposing the sulphuretted hydrogen upon which that factor chiefly depends.

3. That it is capable of preventing the disengagement of sulphuretted hydrogen in sick chambers and in the wards of hospitals, and of removing it in a few minutes when it is present, not merely by dissipating the smell, but by destroying the poison.

4. That the use of it is simple and easy, and as the occasions on which it is required are of constant occurrence, and as it has the peculiar advantage of being itself inodorous, its possession would be a comfort and blessing to private families.

5. That by decomposing the sulphuretted hydrogen it removes from night-soil the poison which renders such matter injurious to health and dangerous to life, and by changing the ammonia from a volatile into a fixed substance, and thereby preventing its escape and loss, it preserves in the night-soil the principle which renders it chiefly valuable as a manure, while it presents that principle to the plant in a form which is known to be highly beneficial to vegetation.

6. That, as it renders the removal of night-soil practicable without creating a nuisance, it ought, in our opinion, to be made a matter of police regulation that no privy or cesspool should be emptied without the previous use of a sufficient quantity of it to destroy all offensive smell.

7. That its most successful application to privies and cesspools is only a palliation of their evil, and does not remove the objection to their existence; that there is and can be no safety but in the immediate removal of all excrementitious and all other refuse matters, and that the retention of such matters in and about dwelling-houses is dangerous to health and life, and altogether unworthy of a nation which has made any progress in civilization.

8. That it is, in our opinion, essential to the health of the people that privies and cesspools, as long as their existence continues to be lawful, should be constructed in such a

manner as to prevent the escape of their liquid contents, and that their construction, so as to secure this object, should be rendered compulsory by a positive legislative enactment."

Thus, what these gentlemen were proposing was neither more nor less than a change in the manners and customs of the English people! It was more than Ledoyen had ever dreamed of, we may be sure.

We shall not go into detail about all the certificates that Ledoyen received in England and Ireland. He obtained about 60 altogether. On June 26, 1847, the Under Secretary of State wrote to Calvert that he had told Earl Grey of all the tests that had been carried out with the disinfectant and that the minister had received them with the greatest interest. The reports were all published by the government under the title *Copies of Letters and Reports received by the Chief Commissioner of Woods and Forests, from Dr. Southwood Smith, Mr. Grainger, and Mr. Toynbee, also of the Physicians, Surgeons, and Others in London, and from Manchester, Liverpool and Ireland, on the Efficacy of Monsieur Ledoyen's Disinfecting Fluid*.³

LEDOYEN IN CANADA

On August 3, 1847, Grey wrote to Lord Elgin as follows:

"I rec'd your private letter by the last mail & I am very much grieved by what you say in it & in your public Despatches of the state of the unhappy Emigrants. It makes me regret more than ever that that pottering blockhead Col. Calvert contrived to lose his passage by the steamer with the disinfecting fluid—I told him over & over again if he did not go by the mail train on Monday night he wd be too late. He did not choose to believe me went by the early train the next day & arrived at Liverpool at 3 the packet having sailed at one—I thought he had no claim to go now so much later in the year so I have refused to allow him but I trust that Auckland will have succeeded in making arrangements for sending some casks of the liquid."⁴

This shows that the British Government had been impressed by Ledoyen's claims enough to give it a trial in checking the typhus epidemic in Canada.

Calvert and Ledoyen eventually arrived by another boat two weeks later. Ledoyen writes to Grey as follows: "In accordance with an order received from your Lordship, we started on the 19th August, 1847, on board the "Caledonia", and arrived at Montreal on the 8th September following. We were received by the Governor-General, Lord Elgin, with the greatest courtesy."⁵ They only stayed in Montreal long enough to publicize the disinfectant. The experiments with it were done at the Montreal General Hospital, to which Ledoyen simply refers as "the English hospital". A commission had been appointed by Lord Elgin to help Ledoyen and watch his experiments. The commission consisted of Drs. M. McCulloch, Francis Badgley, George W. Campbell, James Crawford and Wolfred Nelson.

The report of this Commission has not been preserved; but, judging by his next letter to Grey, Ledoyen must have managed to impress its members favourably:

"This Commission put itself into communication with us to try the value of the fluid. By the report of those gentlemen, which was placed in the hand of Lord Elgin, your Lordship will observe that we succeeded in disinfecting enormous quantities of night-soil, and we also obtained the valuable result in the English hospital of keeping several wards devoid of any effluvia for eight or ten days. It is for similar applications that the Commission attached great importance to our disinfecting fluid to which the advantage attaches of being perfectly inodorous (*sic*) and emitting no odour in its application. Owing to this latter fact; and in order to judge if our fluid would act effectually in disinfecting vessels on board of which fever existed, we received from his Lordship, Lord Elgin, in the latter part of September, an order to go to Quebec and Grosse Isle where emigrant ships were unloading."

THE MARINE AND EMIGRANT HOSPITAL

Ledoyen accompanied by Calvert reached Quebec in September and they settled themselves at the Marine and Emigrant Hospital. Some account of this hospital and its circumstances will be necessary to make the story clear. It had been founded in 1830, primarily for mariners, but later it took in the poor of the city and the emigrants. At the moment it was having trouble amongst its staff. The two chief medical men were Dr. Joseph Painchaud in charge of medicine, and Dr. James Douglas, in charge of surgery, and there were four or five assistants. At first there had been harmony, but before long there was wrangling amongst the doctors and the whole administration of the hospital became affected. There were stories of scandals, real or imaginary. The governors of the hospital intervened, but could do nothing and resigned. The commission which succeeded them had to call on the Government for help. That they had their hands full may be gathered from the titles of the following reports: *Report of the Commissioners of the Marine and Emigrant Hospital, on the Investigation Ordered by them on the Conduct of C. Eusèbe Lemieux, House Surgeon; Cléophas Beaubien, the Apothecary; and Jane Hamilton, a Nurse in the said Hospital and Return to an Address of the Legislative Assembly to His Excellency the Governor General, dated 3rd July, 1851, for Copies of all Correspondence between the Government, the Board of Trade, Dr. James Douglas, the Commissioners, House Surgeon and Visiting Physicians of the Marine and Emigrant Hospital, and Other Parties, Touching the Management of the Said Establishment*.

As time went on the accusations became more detailed; theft of money from the dead and dying, stealing of bodies for dissection; burial of a girl in improper circumstances; enforced conversion of Protestant patients; neglect of the sick; misconduct of the nurses; the telling of racy and even lewd stories by Dr. Painchaud during his classes, and so on.

In 1852 Dr. William Marsden published a most virulent attack on the hospital and several of its medical staff. This he entitled *Facts and Observations Connected with the Management of the Marine and Emigrant Hospital, Quebec, Including a Report of the Trial and Acquittal of Thomas Burke, for the Manslaughter of William Lawson, Who Died from Neglect and Improper Treatment in the Hospital*, and in it he spoke of Dr. Painchaud as the "tricky dean" and accused him of dominating the hospital and officering it with his family and students. Marsden's testimony however cannot be accepted as impartial. Some months before he had been turned out of the hospital, and one of his own students had accused him of "drunken, debauched and immoral habits".

The evil genius of the hospital really was James Douglas, and this is shown by the inquiry made by the Government in 1853. Douglas was one of the most famous surgeons of his time. Physically he was like a Greek god and had the voice and manners of a thundering Jupiter. For years he was the Great Panjandrum of the Marine Hospital and treated it as his personal possession. He came to be dreaded everywhere, and in 1853 a Government commission was appointed to examine the situation thoroughly. The report of this commission is a volume of 124 pages and is an illuminating chapter in the medical history of that period. It is entitled *Report of Drs. Nelson and Macdonnell, and Zephirin Perrault, Esq., Advocate, of the Quebec, Marine and Emigrant Hospital*.

The Secretary was Dr. Antoine von Iffland.* In this report Douglas is shown to have been a complete dictator.

"Nothing short of absolute rule will satisfy Dr. Douglas" the commission said, adding: "Unfortunately for his own reputation as well as for the interests of the Hospital, and indeed, the character of the Medical Profession, Dr. Douglas has been in the habit of treating his colleagues with marked disrespect, rudeness and injustice, which conduct taken into conjunction with his usual treatment of the other Officers, and his intolerance of proper control and dispositions for creating dissatisfaction, if not disturbances in the Hospital, leave no alternative to the Commissioner of Enquiry, than to recommend to Your Excellency, that the services of Dr. Douglas be henceforth dispensed with. They beg respectfully to state for Your Excellency's information, that they have reflected carefully over this matter, and have endeavored as much as possible, to find some extenuating circumstances which would have obviated the measure now recommended; they believe they have given due consideration to the injury the Hospital will sustain by the loss of an able and experienced Surgeon, but they also recollect that other Medical Officers connected with the establishment have performed their duties equally as well and as conscientiously as Dr. Douglas, whom he has been in the daily habit of grossly insulting, not only before other members of the staff, but even before the nurses, students and the patients themselves."⁶

To return to Ledoyen, for actually all these troubles took place some years later. At the time of his visit, that is, in 1847, the directors

of the Marine Hospital were Dr. Morrin of Quebec, a man of high repute, and Dr. Jos. Parent, who hardly paid any attention to the hospital, along with a Mr. H. Gowen, who was a semi-invalid. Ledoyen and Calvert, however, gave their demonstrations under Painchaud and Douglas. Painchaud described conditions in a later account as follows:

"The patients were placed in the sheds as soon as part of them were completed, but as at first the roof was only composed of boards, not tongued and grooved, it became necessary, at the approach of a storm, hurriedly to remove all the patients into the Hospital. The whole building was filled, and indeed over-crowded; the Chapel, Commissioner's Room, a part of the House Surgeons quarters, the passages, staircases, garrets, and even the cellars; it was literally necessary to make great strides to avoid treading upon the sick, the servants themselves took sick, and it was found impossible to replace them."⁷

Ledoyen collected his usual crop of certificates as to the striking effects of his fluid in deodorizing wounds and healing sores. One certificate signed by Painchaud and Douglas wound up by saying that in no instance had any ill effect been caused by the general or topical use of the fluid. Later on Douglas either altered his opinion or else contradicted himself, as he says "... its inhalation, in my opinion, had an injurious effect on the patients."

Painchaud's son, who was on the staff, also gave a glowing certificate in favour of the fluid, adding that M. Ledoyen "had met with complete success in disinfecting the privy of the hospital". Painchaud Jr. later resigned from the hospital, probably on account of Douglas.

Ledoyen also gave demonstrations before mixed medical and lay audiences. He always made the most of these and would obtain confirmation of his results in such statements as the following: "We the undersigned, having been present during some experiments made at Dr. Parant's residence, with M. Ledoyen's "disinfecting fluid" upon faeces, certify:—That by the use of the said fluid, the disinfection of said matters was obtained instantaneously, without leaving afterwards the least offensive smell."

This was the result of a seance at Dr. Jacques Parant's house in Quebec and was signed by Dr. J. H. Nault, Mr. H. Gowen, of the Marine Hospital and Abbé Antoine Parent, Superior of the Seminary.

Typhus however was not to be treated with impunity, even under the protection of Ledoyen's magic fluid, and as might be expected, both Calvert and Ledoyen developed the disease. Ledoyen apparently had only a mild form, but Calvert died within a few days. Ledoyen wrote to Grey about it as follows:

"It is here my painful duty to relate that at that period I was deprived of the valuable assistance of Colonel Calvert, who was taken ill, arising from the immense fatigue, anxiety, and exertion which he evinced in his ardent wish, not only to fulfil the high responsibility your Lordship conferred on him, but also in the ardent zeal he showed in conferring relief on those bowed down with disease and affliction. In relieving sufferers he forgot the evidence that every day medical men were falling

*Canadians had difficulty in pronouncing his name and called him "Docteur Va R'nifler".

victims to the raging epidemic which carried off so many thousand individuals. By working night and day he brought on himself that fever which deprived me of an indefatigable colleague and warm-hearted friend, and his family of an affectionate parent."⁸

But we have another very different account from Dr. James Douglas who says:

"The next, and about the last prominent victim of this foul distemper, was Col. Calvert himself. I was called to him in the preliminary stage of the disease, and as he could not be permitted to remain in the Hotel, I had him removed to my own house, and placed in the care of a faithful and excellent nurse. Col. Calvert was a tall, handsome, military looking gentleman, apparently about seventy years of age. He was, and evidently had been, a free liver, though by no means intemperate in his habits. He was fully aware of his imminent danger, and met it coolly and manfully.

"Calvert must naturally have possessed great presence of mind, even when he was 'in extremis,' he gave me an extraordinary proof of this quality. In the last stage of the disease, when semi-conscious, and apparently quite unconscious, Mons. L— entered his room and perceiving his state and condition, he sent the nurse down stairs on some pretence, and then rifled his pockets and his valise. This roused up Col. Calvert, who watched the proceeding without making any sign, or evincing any symptom of consciousness. On my visiting him shortly afterwards, he managed to tell me the circumstances, and soon lapsed into total insensibility, from which he never emerged. In the meanwhile, I had sent for L— and charged him with the robbery; he of course stoutly denied it until I was fully prepared with proof of the act by a witness to the transaction, and if he did not at once restore the stolen money, I would expose him to the consequences. I told him of his theft, if not detected, would have exposed my servants to the gravest suspicions, which it would have been impossible for them to explain or to remove. Monsieur L— restored the stolen money, and he took my advice to visit the United States with as little delay as was possible. I told him that I would state the fact to the Government and to Col. Calvert's friends, and he might explain them as well as he was able. Thus ended the episode of the famous disinfecting fluid, of which I have never since heard anything."⁹

Now, in my opinion, this accusation against Ledoyen must not be given too much weight, for Douglas' evidence is not always trustworthy. Here, for instance, is an extract from the previously mentioned report by Nelson, Macdonnell and Perrault:

"During the interviews between Dr. Douglas and the Commissioners, that gentleman made other charges against the Officers of the Institution. He stated that some of the Sailors, inmates of the Hospital, had been robbed of their money, and that the money had been divided between the present House Surgeon and some of the Nurses, and the late Steward, Mr. Cutter. That in one particular case, a cheque of Mr. Deane's, the President of the Board of Trade, had been cashed, and when the owner was about dying, he made a will distributing this money amongst the officers of the Hospital above named. That the will was made in such an irregular manner, and the circumstances of the case were so peculiar that three Notaries to whom application was made to draw up the will refused to do so, as such a transaction was discreditable to a charitable institution. Dr. Douglas also referred to the case of a Sailor named McIntosh whose money was stolen from him by one of the Nurses. The Commissioners having discovered, that with the exception of this one case, Dr. Douglas could not specify any instance where a similar disposition of a patient's effects had been made, and as this very case had been thoroughly enquired into, and the accused parties acquitted by the decision of Your Excellency, the Commissioners did not conceive that they were called upon to re-investigate the matter."¹⁰

This Report gives us a very fair idea of the personality of Dr. Douglas. We also have his *Journal and Reminiscences*, although this has not been published in its entirety. His son James Douglas, is fair-minded enough to say of his father: "Those who knew him well wondered that he remained obscure. Perhaps he knew himself better than others knew him, and may have suspected that the strong properties of his nature were mingled with others so inconsistent that the resultant was a character too eccentric and full of contradictions to bear the scrutiny of the public eye."

Dr. Douglas' greatest fault was jealousy: it was his biggest handicap.

Let me conclude this episode by saying that perhaps Ledoyen did rob Calvert in his last moments, but we must have the word of someone else rather than of Douglas to make us believe it.

LEDOYEN LEAVES CANADA

In spite of Dr. Douglas' statement, Ledoyen did not go to the States in any hurry or under any cloud. He left Quebec for Montreal and, there, he inspected the sheds which then were housing the typhus patients in that city. He reports to Earl Grey as follows:

"It appears to me that the sheds at Montreal have not been built in a proper situation; placed as they are, the west winds, which last the greater part of the year, bring into the town the infectious effluvia arising from the sheds: further, these sheds being built near the town and on the borders of the St. Lawrence, the water of the river brings to the borders of the town the refuse from the hospitals, and consequently the water is impregnated, and may become a source of disease to the inhabitants. I also make the remark, that the cemetery is too near the hospital . . . , being placed in the centre of the sheds; most serious consequences may result when we reflect that above 2,000 people were buried there last autumn, coffins in many instances being placed one above the other, and only within a few inches of the surface of the ground. When the snow disappears, and heat brings on rapid decomposition, I apprehend serious results at Montreal. Upon my arrival I had all my private certificates countersigned by the Governor-General, Lord Elgin."

His fears were not realized as there was no epidemic the following spring, (but one can hardly say that his foreboding was quite unjustifiable).

Ledoyen left Canada quite satisfied with things. Apart from the fact that he had escaped the fate of his companion Colonel Calvert, he had done very well as far as he himself was concerned. His disinfectant was selling well and everyone praised him. Both the Government and the medical profession had treated him well. It is true that the watchful eye of the editor of the *British American Journal of Medical & Physical Science* was on him, and that a somewhat more critical appraisal of the wonderful fluid was written editorially, but even this did not appear until after Ledoyen's departure. No one seemed to want to hurt his feelings. And Ledoyen expressed his gratitude (to Sir George Grey as usual) for his kindly reception by the medical profession.

Before his departure he left a large stock of his fluid with a doctor whom he had appointed as his representative in Canada. "Before leaving Canada, I gave my fluid into Dr. Pacot's hands to sell it, and to make the best use possible of it, on condition that he shall give 15 per cent of the profits arising from the sale to the Irish hospitals at Montreal and Quebec."

This "Dr. Pacot" was probably Dr. Pierre-Etienne Picault of Montreal, who was a Frenchman by birth and had not been allowed to practise until 5 years after his arrival in Canada in 1833. He had a drugstore at the corner of Notre Dame and Bonsecours Streets which was well known for many years.¹¹

Incidentally, Ledoyen's solicitude for the Irish in Montreal shows that he realized how much they suffered from disease as immigrants.

On arrival at New York Ledoyen found that his fluid had been tested in disinfection of ships for yellow fever, and accepted as successful. He took out a patent of his fluid and also gathered all his reports and printed them in one volume. When he finally reached England he made a complete report of his work in Canada and this was published in *Parliamentary Papers* along with other papers regarding emigration. He concluded his report with these words: "In conclusion, I trust the Government of Great Britain may find that it will be a public benefit to make arrangements with me for spreading the knowledge and use of my fluid through every portion of the British Dominions at the lowest possible cost, and I shall be happy to concur in those arrangements."

What became of him after that we do not know. Nor is it possible to make out even from the voluminous reports which he collected on the matter, what Ledoyen's fluid really was. In two places specific mention is made of its analysis but when it comes to the point the actual substance employed is left blank. Douglas found it to be nitrate of lead, and Wolfred Nelson also said it was that. In case it may appear from the steady flow of encomiums received by Ledoyen, that the medical profession committed itself too strongly in the matter, here is the editorial comment from the *B.A.J. of Med. & Phys. Science* of December, 1847, some days after Ledoyen's departure:

"*The Disinfecting Fluids.*" The experiments with these fluids have been brought to a close, and from all that we have heard and read upon the subject, our opinion as to any disinfecting properties possessed by either Sir W. Burnett's or Mr. Ledoyen's is still unaltered. According to the results of some experiments made at the Marine Hospital, Quebec, to determine which possessed the greater power in mitigating or destroying the effluvia from the soil, votes were given in favour of Sir W. Burnett's fluid. We apprehend, however, that not much difference exists between them both in this respect. M. Ledoyen treated the profession in Quebec to some novel therapeutic ideas in relation to the injurious agency of the preparations of zinc on the animal economy when applied to, and absorbed from ulcerated surfaces. This is worth noticing only in so far as it evinces to what extent a preconceived

notion with strong enthusiasm can warp the judgment and influence the reasoning facilities of an individual. M. Ledoyen has left for England, after having suffered from typhus himself; and poor Colonel Calvert is no more, having succumbed to a more virulent attack of the same disease. We sincerely sympathize with Colonel Calvert's family in this bereavement they have suffered; but at the same time, we regard the consequences to M. Ledoyen and Colonel Calvert, as a strong proof of the fallacy of the views which they entertained, and as affording matter for a homily on the whole affair."¹²

That then is the end of Ledoyen and his "discovery". We can not do better than repeat James Douglas' final comment "Thus ended the episode of the famous disinfecting fluid, of which I have never since heard anything."

REFERENCES

1. An anonymous study in *La Revue Canadienne*, 1898-99, vols. 34-35. On typhus see also: Cline, J. D.: *Canad. M. & Surg. J.*, 1877, p. 145, and Tucker, G.: *Am. Hist. Rev.* 1931, p. 532.
2. Collection Elgin-Grey (Public Archives of Canada), Ottawa, 1937, 1: 57.
3. See Reports, Certificates of Monsieur Jean Ledoyen, Oliver & Bro., New York, 1848.
4. Collection Elgin-Grey, 1: 62.
5. *Ibid.*: 4: 1313.
6. Report of Drs. Nelson and Macdonnell, p. 96.
7. *Ibid.*: p. 123.
8. Collection Elgin-Grey, 4: 1316.
9. Journal and Reminiscences of James Douglas, M.D., edited by his son, New York, 1910, p. 158. On Dr. Douglas see Howell, W. B.: *Medicine in Canada*, New York, 1935, 66 seq. On his son see P.-G. Roy: *Fils de Québec*, Levis, 1933, 4: 163.
10. Report of Drs. Nelson and Macdonnell, p. 20.
11. MASSICOTTE, E. Z.: *Le Bull. des Recherches Historiques*, 1939, 45: 273. See also Borthwick, J. D.: *History and Biographical Gazetteer of Montreal to the Year 1892*, Montreal, 1892, p. 186.
12. *British American Journal of Medical and Physical Science*, 1847, 48: 158.

CATECHISM IN MEDICAL HISTORY

By Heber C. Jamieson, M.D., F.R.C.P.(C)

Edmonton

QUESTIONS

1. What real contribution did homœopathy make to Medicine?
2. Within the last half century there were prescriptions compounded on the seventeenth century principle. What was this principle?
3. What vein used now in phlebotomy received its name from the same practice in mediæval Medicine, but was misnamed?
4. What, briefly, were the principles of medical treatment in the last quarter of the seventeenth century in Europe?
5. What Dublin physician was a hundred years ahead of his time in the treatment of typhoid fever?
6. What English physician applied the laws of Physics and Mathematics to a physiological phenomenon and thereby became a Professor of Chemistry at Oxford?
7. Who introduced gauze as a surgical dressing?
8. What is the origin of the word "autopsy"?
9. Who is Dr. Mortimer Post?
10. What ancient king introduced a universal remedy which is still used in some countries in Europe?

11. What Saints of Medicine and Pharmacy were taken over by the Surgeons of mediæval times?
12. What is a Scultetus bandage?
13. What seventeenth century English physician came near to discovering oxygen?
14. The ingratitude of the patient on recovery has frequently been expressed in verse. Can you quote two such verses?

ANSWERS

1. Hahnemann was influential in reducing dosage of the common drugs. Digitalis had been given in poisonous doses. Even in 1850 one ounce of the official tincture was given as a single dose. Dover's powder was given in seventy to eighty grain doses at once. Mercury and antimony were given in poisonous amounts. The homœopathic dose was so small that one wit suggested that for dog bite "take one hair of the dog that bit you." Undoubtedly this system played its part in curbing wholesale poisoning.
2. A basic medicine was first used. Next a corrective drug was added to overcome the faults of the basic drug. Now came an adjuvant to support the faults of the basis. An excipient to round out and act as a vehicle completed the formula. Perhaps your favourite book on Therapeutics still follows this.
3. The cephalic. The mediæval blood-letter believed that in affections of the brain blood let from this vein would give relief, hence its name.
4. John Locke (1632-1704), better known as a philosopher, was a practitioner and he writes: "You cannot imagine how far a little observation, carefully made by a man not tied up to the four humours; or sal, sulphur, and mercury; or to acid and alcali, which has of late prevailed, will carry a man in the curing of diseases, though very stubborn and dangerous, and that with very little and common things, and almost no medicine at all."
The four humours = the dogma of Hippocrates and Galen. The sal, sulphur and mercury = the practice of Paracelsus and van Helmont.
The acid and alcali = the chemical system of Sylvius and Willis.
5. Robert Graves (1797-1853). At a time when fevers were treated by starvation, Graves fed his patients with success. To Stokes he once said: "Will you, when the time comes, write my epitaph, and let it be — 'He fed fevers'?"
6. Dr. John Freind (1675-1728). In his first work, on menstruation, he applied the laws of hydraulics and the methods of statistics to the menstrual phenomena with such

success that he was elected Professor of Chemistry the following year, 1704. He was among the first to write a history of Medicine.

7. Lord Lister. In the eighties of the last century Lister was seeking a suitable dressing for his operation wounds. Oakum, such as used for calking the seams of vessels, was tried but the odour was found too offensive for the patient and he cast about for a substitute and found a cheap gauze which he soaked in a mild carbolic acid solution.
8. Originally this word meant only "direct examination, personal inspection" and was in general use, but when physicians used it to mean inspection of a cadaver, others discontinued its use in any other sense.
9. In some hospitals when an autopsy is arranged, a call goes over the announcing system for "Dr. Mortimer Post".
10. Mithridates VI (132-63 B.C.). "The Great King of Pontus". His name is preserved in "Mithridatum" a medical formula composed of over 61 ingredients. Later it was called "Theriaca".
11. St. Cosmas and St. Damian. These were two Arab brothers who practised Medicine gratuitously. In 1210 the College of St. Come was founded in Paris by the Confraternity of Surgeons. The physicians had St. Luke and a hundred minor Saints. The surgeons had to content themselves with these two minor Saints, and curiously enough two who charged no fees.
12. A many-tailed bandage, introduced by Johann Scultetus (1595-1645). In Europe this name is still in common use.
13. John Mayow (1643-1679), an Oxford physiologist, wrote: "Respiration consists in the separation from the air by the lungs, and the intermixture with the blood-mass, of certain particles absolutely necessary to animal life, and the loss by the inspired air of some of its elasticity. The particles of the air, absorbed during respiration, are designed to convert the black or venous blood into the red or arterial". Mayow also declared the placenta to be the lungs of the fetus.
14. "God and the doctor we like adore,
But only when in danger, not before;
The danger o'er, both are alike requited,
God is forgotten, and the doctor slighted."
—Pope.
"Three faces wears the doctor: when first sought,
An angel's—and a God's the cure half wrought;
But when, that cure complete, he seeks his fee,
The Devil looks then less terrible than he."
—Cordus.

Association Notes

THE SEVENTY-FIFTH ANNUAL MEETING OF THE Canadian Medical Association

In conjunction with the 64th Annual Meeting of the
ONTARIO DIVISION OF THE ASSOCIATION
TORONTO, MAY 22, 23, 24, 25, 26, 27, 1944

Convention Headquarters — ROYAL YORK HOTEL

The Canadian Medical Association

<i>President</i>	- - -	DR. D. SCLATER LEWIS, Montreal
<i>President-Elect</i>	- - -	DR. HARRIS MCPHEDRAN, Toronto
<i>General Secretary</i>	- - -	DR. T. C. ROUTLEY, Toronto

The Ontario Division

<i>President</i>	- - -	DR. F. A. BROCKENSHIRE, Windsor
<i>President-Elect</i>	- - -	DR. H. M. TORRINGTON, Sudbury
<i>Secretary</i>	- - -	DR. A. D. KELLY, (on military service)
<i>Assistant Secretary</i>	- - -	DR. J. W. MCCUTCHEON, Toronto

The Convention

Plans have been completed for what promises to be an excellent convention. A very attractive series of Round Table Conferences has been arranged for Wednesday and Thursday mornings, from nine o'clock until ten, to be followed by General Sessions.

Sectional Meetings will be held on Wednesday and Thursday afternoons.

The General Session on Friday morning will take the form of a discussion on health insurance and allied problems.

The Ontario Division of the Canadian Medical Association will hold its annual meeting on the afternoon of Friday, May 26, continuing on Saturday, May 27, until the business has been completed.

Hotel Reservations

Be sure to make your hotel reservations early, indicating the type of accommodation desired and the definite time of arrival.

Central Program Committee

The Central Program Committee which is responsible for the scientific program is as follows:

DR. DUNCAN GRAHAM (*Chairman*)
DR. ALAN BROWN
DR. H. K. DETWEILER
DR. H. A. DIXON
DR. ROSCOE GRAHAM

DR. J. C. MCCLELLAND
DR. ALEXANDER E. MACDONALD
DR. HARRIS MCPHEDRAN
DR. WILLIAM SCOTT
DR. H. J. SHIELDS
DR. A. C. SINGLETON
DR. D. E. S. WISHART
DR. GEORGE S. YOUNG
DR. HARVEY AGNEW
DR. T. C. ROUTLEY

Committee in Charge of Local Arrangements

DR. HARRIS MCPHEDRAN (*Chairman*)
DR. J. W. MCCUTCHEON (*Secretary*)
DR. FRANK PLEWES
DR. WILLIAM MAGNER
DR. W. C. GIVENS
DR. S. J. N. MAGWOOD
DR. GILBERT PARKER
DR. HARVEY AGNEW

Scientific Exhibits

The four Medical Services—Navy, Army, Air Force and Pensions and National Health, are arranging to provide the scientific exhibits. This exhibition will be one of the most interesting and attractive features of the convention.

Federation of Medical Women of Canada

The Annual Meeting of the Federation of Medical Women of Canada will take the form of a dinner to be held in Private Dining Room No. 9, Royal York Hotel, on Thursday, May 25 at 7.00 p.m.

Canadian Medical Protective Association

The Canadian Medical Protective Association will hold its annual meeting immediately following the scientific program at five o'clock on the afternoon of Thursday, May 25.

Canadian Society for the Control of Cancer

The Grand Council of the Canadian Society for the Control of Cancer will meet on Thursday evening, May 25, at eight o'clock.

Royal College of Physicians and Surgeons of Canada

The Council of the Royal College of Physicians and Surgeons of Canada will meet on Thursday evening, May 25, at 8.30 o'clock, continuing on Friday afternoon and evening or until the business is completed.

Meeting of Industrial Physicians

The Committee on Industrial Medicine of the Canadian Medical Association and the Committees of the Quebec and Ontario Divisions will present a program for industrial physicians on Tuesday, May 23, at the Royal York Hotel, Toronto, commencing at 9.00 a.m.

At the morning session there will be a Round Table discussion of selected subjects, with a group of visiting industrial physicians, including Dr. C. D. Selby, General Motors Corporation, Dr. H. L. Kreiger, Ford Motor Company, and Dr. Carey P. McCord, Chrysler Corporation, taking part.

The luncheon meeting will be addressed by the Honourable Dr. R. P. Vivian, Minister of Health for Ontario.

In the afternoon a symposium will be held on certain aspects of the management of compensable accident and sickness cases.

The opportunity will be taken at this meeting to obtain an expression of opinion on the formation of a Section of Industrial Medicine in the Association.

Canadian Society for the Study of Diseases of Children

The Canadian Society for the Study of Diseases of children will meet in Private Dining Room No. 10 on Thursday, May 25 at 4.00 p.m.

Class Reunion

Toronto '14 Class Reunion Dinner will be held on Thursday, May 25, at 6.00 p.m. in Hall B.

GENERAL PROGRAM

FRIDAY AND SATURDAY, MAY 19 AND 20

EXECUTIVE COMMITTEE SESSIONS

MONDAY, MAY 22

- 9.00 a.m.—Registration.
- 9.30 a.m.—Meeting of General Council.
- 1.00 p.m.—Luncheon.
- 2.00 p.m.—Meeting of General Council.
- 6.00 p.m.—Meeting of Nominating Committee.
- 7.00 p.m.—Medical Secretaries' Dinner and Conference.

TUESDAY, MAY 23

- 9.00 a.m.—Registration.
- 9.30 a.m.—Meeting of General Council.
- 1.00 p.m.—Luncheon.
- 2.00 p.m.—Meeting of General Council.
- 7.00 p.m.—Dinner to General Council.
- Hosts: The Ontario Division.
- Speaker: Leonard W. Brockington, K.C., LL.D., Ottawa.

WEDNESDAY, MAY 24

- 8.30 a.m.—Registration.
- 9.00 a.m.—Round Table Conferences.
- 10.15 a.m.—General Session.

WEDNESDAY, MAY 24—Continued

12.30 p.m.—Luncheon.

Brief addresses by—
Major General Brock Chisholm,
Director General of Medical
Services (Army).
Surgeon Captain A. McCallum,
Medical Director General
(R.C.N.).
Air Commodore J. W. Tice,
Director of Medical Services
(Air).

- 2.00 p.m.—Sectional Meetings.
- 8.30 p.m.—Annual General Meeting.
- 10.00 p.m.—Reception and Dance.

THURSDAY, MAY 25

- 8.30 a.m.—Registration.
- 9.00 a.m.—Round Table Conferences.
- 10.15 a.m.—General Session.
- 12.30 p.m.—Luncheon.
- Question and Answer Period conducted by members of the Central Program Committee.
- Chairman—
Dr. Duncan Graham.
- 2.00 p.m.—Sectional Meetings.
- 2.00 p.m.—Meeting of incoming C.M.A. Executive Committee.
- 5.00 p.m.—Annual Meeting Canadian Medical Protective Association.

FRIDAY, MAY 26

- 8.30 a.m.—Registration.
 9.30 a.m.—General Session.
 2.00 p.m.—The Ontario Division—Meeting of Council.
 8.00 p.m.—The Ontario Division—Meeting of Council.

SATURDAY, MAY 27

- 9.30 a.m.—The Ontario Division—Meeting of Council.
 1.00 p.m.—The Ontario Division—Annual Business Luncheon.

SCIENTIFIC PROGRAM

ROUND-TABLE CONFERENCES

Anæsthesia

WEDNESDAY, MAY 24

- 9.00–10.00 a.m.
 Factors leading to fatalities under inhalation anæsthesia.
 Dr. H. J. Shields, Toronto (*Chairman*)
 Surg. Lieut. Digby Leigh, R.C.N.V.R., Montreal
 Dr. C. H. Robson, Toronto

THURSDAY, MAY 25

- 9.00–10.00 a.m.
 Factors leading to fatalities under spinal anæsthesia.
 Dr. W. E. Brown, Toronto (*Chairman*)
 Dr. Ralph Hargrave, Toronto
 Dr. D. C. Aikenhead, Winnipeg

Dermatology

WEDNESDAY, MAY 24

- 9.00–10.00 a.m.
 Diagnosis and treatment of seborrhœic dermatitis.
 Dr. E. J. Trow, Toronto (*Chairman*)
 Dr. F. S. Lazenby, Toronto
 Dr. G. S. Williamson, Ottawa

Dermatology and Radiology

THURSDAY, MAY 25

- 9.00–10.00 a.m.
 The treatment of plantar warts.
 Dr. H. A. Dixon, Toronto (*Chairman*)
 Dr. E. J. Trow, Toronto
 Dr. W. C. Kruger, Toronto

Medicine and Surgery

WEDNESDAY, MAY 24

- 9.00–10.00 a.m.
 Diagnosis and treatment of carcinoma of the stomach and colon.
 Dr. Roscoe Graham, Toronto (*Chairman*)
 Dr. E. E. Cleaver, Toronto
 Dr. A. C. Singleton, Toronto
 Dr. Joseph Daly, Toronto

Medicine, Obstetrics and Gynæcology

THURSDAY, MAY 25

- 9.00–10.00 a.m.
 Heart disease and pregnancy.
 Dr. John Hepburn, Toronto (*Chairman*)
 Dr. Nelson Henderson, Toronto
 Dr. Carlyle Hamilton, Toronto

Obstetrics and Gynæcology

WEDNESDAY, MAY 24

- 9.00–10.00 a.m.
 Diagnosis and treatment of uterine cancer.
 Dr. W. G. Cosbie, Toronto (*Chairman*)
 Surgeon Lt. Commander J. R. McArthur, R.C.N.V.R., Halifax
 Dr. G. E. Richards, Toronto

Ophthalmology

THURSDAY, MAY 25

- 9.00–10.00 a.m.
 Plastic surgery of the eye.
 Dr. Walter W. Wright, Toronto (*Chairman*)
 Dr. Lloyd Morgan, Toronto

Otolaryngology

THURSDAY, MAY 25

- 9.00–10.00 a.m.
 Head colds.
 Dr. D. E. S. Wishart, Toronto (*Chairman*)
 Dr. A. A. Campbell, Toronto
 Wing Commander R. F. Farquharson, R.C.A.F., Toronto

Pædiatrics

WEDNESDAY, MAY 24

- 9.00–10.00 a.m.
 Maternal feeding.
 Dr. J. H. Ebbs, Toronto (*Chairman*)
 Dr. William Dafoe, Toronto
 Dr. C. E. Snelling, Toronto

THURSDAY, MAY 25

9.00 - 10.00 a.m.

Chemotherapy in children.

Dr. Nelles Silverthorne, Toronto
(Chairman)

Dr. J. L. McDonald, Toronto
Dr. Alan Brown, Toronto

Radiology

WEDNESDAY, MAY 24

9.00 - 10.00 a.m.

Chest lesions following general surgical procedures.

Dr. W. J. Cryderman, Toronto (Chairman)
Dr. M. M. R. Hall, Toronto
Dr. A. R. McGee, Toronto

Surgery

THURSDAY, MAY 25

9.00 - 10.00 a.m.

Burns.

Wing Commander A. W. Farmer, R.C.A.F.,
Toronto (Chairman)
Dr. Douglas Ackman, Montreal
Dr. R. M. Wansbrough, Toronto

Urology

THURSDAY, MAY 25

9.00 - 10.00 a.m.

Carcinoma of the prostate.

Dr. N. W. Roome, Toronto (Chairman)
Dr. R. J. McComb, Toronto
Dr. Ross Flett, Toronto

GENERAL SESSIONS

WEDNESDAY, MAY 24

10.15 a.m.

Medical care of the industrial worker
Dr. R. B. Robson, Windsor

Primary atypical pneumonia
Colonel W. P. Warner, R.C.A.M.C., Ottawa

The President's Valedictory Address
Dr. D. Selater Lewis, Montreal

The management of pre-eclampsia
Dr. N. J. Eastman, Baltimore

Abdominal injuries in a field surgical unit
Captain E. B. Tovey, R.C.A.M.C., Toronto

THURSDAY, MAY 25

10.15 a.m.

The management and prevention of rheumatism.

Dr. R. R. Struthers, Montreal.

The management of breast tumours
Dr. Roy D. McClure, Detroit

THURSDAY, MAY 25—Continued

Symposium on penicillin in which the following speakers will take part:

Dr. P. H. Greey, Toronto
Wing Commander R. F. Farquharson,
Toronto
Dr. Douglas Ackman, Montreal
Dr. W. E. Gallie, Toronto

FRIDAY, MAY 26

9.30 a.m.

Conference on health insurance in which a number of selected speakers will take part

SECTIONAL MEETINGS

Section of Anæsthesia

Chairman—Dr. Kenneth Heard
Secretary—Dr. S. M. Campbell

WEDNESDAY, MAY 24

2.00 p.m.

Anæsthesia in the aged
Surg. Lt. E. H. Watts, R.C.N.V.R.,
Edmonton

Endotracheal anæsthesia in children
Dr. C. H. Robson, Toronto

The use of curare in anæsthesia
Dr. Harold Griffith, Montreal

Pentothal as an adjuvant to other forms of anæsthesia
Dr. Kenneth Heard, Toronto

THURSDAY, MAY 25

2.00 p.m.

The sequelæ of spinal anæsthesia
Dr. D. C. Aikenhead, Winnipeg

Anæsthesia as practised on active service in the Navy
Surg. Lt. Commander Carl Stoddard,
R.C.N. Hospital, Halifax

The modified leech technique of cyclopropane administration
Dr. J. Earl Murphy, Regina

The use of pentothal sodium in an army anæsthesia service
Major George D. M. Boddington,
R.C.A.M.C., Camp Borden

Section of Dermatology

Chairman—Dr. F. A. Ireland
Secretary—Dr. F. S. Lazenby

WEDNESDAY, MAY 24

2.00 p.m.

Generalizing eruptions following topical treatment of the skin
Dr. E. J. Trow, Toronto

Eruptions of the skin due to drugs, with special reference to the sulfa group
Dr. J. F. Burgess, Montreal

WEDNESDAY, MAY 24—*Continued*

The treatment of scabies and other animal parasitic diseases of the skin—a wartime problem

Dr. Harold Orr, Edmonton

Congenital syphilis

Dr. Frederick Kalz, Montreal

Section of Medicine

Chairman—Dr. E. F. Brooks

Secretary—Dr. Harold Kinsey

WEDNESDAY, MAY 24

2.00 p.m.

Indications for shock therapy in mental illness

Dr. L. D. Proctor, Toronto

Psychoneuroses in the army overseas

Dr. H. H. Hyland, Toronto

Some points concerning pulmonary embolism

Dr. Neil Feeney, Montreal

The menace of tropical diseases in Canada

Dr. F. B. Bowman, Hamilton

THURSDAY, MAY 25

2.00 p.m.

Causes of rejection and incidence of defects in recruits

Lt. Colonel Frank S. Park, R.C.A.M.C., Toronto

Medical treatment of gastric hæmorrhage

Dr. C. J. Tidmarsh, Montreal

Gastro-intestinal symptoms in cardiac disease

Dr. J. W. Scott, Edmonton

Evaluation of a normal heart

Dr. John M. McEachern, Winnipeg

Section of Ophthalmology

Chairman—Dr. W. W. Wright

Secretary—Dr. Lloyd Morgan

THURSDAY, MAY 25

2.00 p.m.

Cataract following corneal scleral trephine operation

Dr. J. F. A. Johnston, Toronto

A survey of the ophthalmic status of the Cree Indians at Norway House, Manitoba

Wing Commander John V. V. Nicholls, Ottawa

Problems in x-ray localization

Dr. J. A. MacMillan, Montreal

Changes in the fields of vision in syphilis

Dr. Stuart Ramsey, Montreal

The value of orthoptics in the treatment of strabismus

Dr. Lloyd Morgan, Toronto

Section of Otolaryngology

Chairman—Dr. Angus Campbell

Secretary—Dr. J. G. Strachan

THURSDAY, MAY 25

2.00 p.m.

Otolaryngological problems in war service

Dr. H. W. D. McCart, Toronto

Vasomotor rhinitis

Dr. W. P. E. Paterson, Ottawa

Some essentials in the examination of the ear

Dr. G. E. Hodge, Montreal

Dr. E. E. Scharfe, Montreal

Carcinoma of the larynx

Dr. D. H. Ballon, Montreal

Meniere's disease with some observations on its treatment with histamine

Dr. A. A. Campbell, Toronto

Section of Obstetrics and Gynæcology

Chairman—Dr. W. G. Cosbie

Secretary—Dr. Frank O'Leary

WEDNESDAY, MAY 24

2.00 p.m.

Pelvic endometriosis

Dr. D. M. Low, Toronto

Some varieties of uterine rupture

Dr. N. J. Eastman, Baltimore

The importance of blood studies in the obstetrical patient

Dr. N. W. Philpott, Montreal

The physiology and treatment of the menopause

Dr. J. S. Henry, Montreal

Section of Pædiatrics

Chairman—Dr. E. A. Morgan

Secretary—Dr. Nelles Silverthorne

WEDNESDAY, MAY 24

2.00 p.m.

Prevention, treatment and end results of meningitis

Dr. Nelles Silverthorne, Toronto

Prevention and treatment of hæmorrhagic disease

Dr. Percival E. Williams, Hamilton

(To be announced)

The hypothyroid child

Dr. Howard Spohn, Vancouver

THURSDAY, MAY 25

2.00 p.m.

Prevention and treatment of coeliac disease

Dr. J. H. Ebbs, Toronto

Practical methods of supplying the essential vitamins of childhood

Dr. Elizabeth Chant Robertson, Toronto

Some problems arising from the neo-natal period of life

Dr. Graham Ross, Montreal

Allergic manifestations of the newborn period

Dr. George A. Campbell, Ottawa

Section of Radiology

Chairman—Dr. E. H. Shannon

Secretary—Dr. C. L. Ash

WEDNESDAY, MAY 24

2.00 p.m.

The rôle of the radiologist in the management of fractures

Dr. W. C. Kruger, Toronto

Osteogenic sarcoma developing on Paget's disease of bone

Dr. Ronald Burr, Kingston

Lipiodal myelography; experiences with the injection and withdrawal of the iodized oil in 250 cases

Dr. R. A. Macpherson, Winnipeg

An evaluation of roentgen pelvimetry

Dr. T. G. Stoddart, Ottawa

Dyschondroplasia and some allied conditions

Dr. A. H. Rolph, Toronto

THURSDAY, MAY 25

2.00 p.m.

X-ray aid in the differentiation of functional from structural changes in the gastro-intestinal tract

Dr. W. M. Gilmore, Stratford

A propos d'un cas de diverticule de l'œsophage

Dr. Paul Brodeur, Montreal

Some phases of military radiology

Major R. W. Boyd, R.C.A.M.C., Ottawa

Radiological survey of the incidence of pulmonary tuberculosis in the Royal Canadian Navy from 1939 to 1943

Surgeon Commander C. B. Peirce, Montreal

Surgeon Lt. Commander G. Jarry, Montreal

Radiological findings in lesser sac effusions

Dr. M. C. Morrison, London

Section of Surgery

Chairman—Dr. R. M. Janes

Secretary—Dr. F. R. Wilkinson

WEDNESDAY, MAY 24

2.00 p.m.

Avulsed skin as a whole-thickness graft

Wing Commander A. W. Farmer, R.C.A.F., Toronto

The abuse of iodine in hyperthyroidism

Dr. R. R. Fitzgerald, Montreal

Fractures of the wrist and hand

Surgeon Commander H. S. Morton, R.C.N.V.R., Esquimalt

End results of removal of internal semi-lunar cartilage in personnel of the air force.

Dr. Murray Meekison, Vancouver

THURSDAY, MAY 25

2.00 p.m.

Pyloric stenosis with alkalosis in gastric tetany

Dr. Jessie Gray, Toronto

Postoperative survival periods in gastrointestinal carcinomata

Dr. Lyon H. Appleby, Vancouver

Experiences with intravenous pectin solution in the prevention of shock

Dr. Roy D. McClure, Detroit

Carcinoma of the stomach

Dr. P. H. T. Thorlakson, Winnipeg

Section of Urology

Chairman—Dr. R. J. A. McComb

Secretary—Dr. C. R. B. Crompton

WEDNESDAY, MAY 24

2.00 p.m.

Unusual secondary testicular growth in the lung

Dr. C. A. Chisholm, Toronto

Renal calculi in the recumbent patient

Dr. K. F. Davis, Weston

Dr. J. C. McClelland, Toronto

Stone in the lower (pelvic) ureter

Dr. E. R. Hall, Vancouver

Survey of urology in a military general hospital

Captain D. A. Duckworth, R.C.A.M.C., Toronto

Bone formation from the genito-urinary tract

Dr. A. C. Abbott, Winnipeg

THURSDAY, MAY 25

2.00 p.m.

A Muellerian duct cyst in a male

Dr. Emerson Smith, Montreal

Dr. Alex. Strasberg, Montreal

Papillary tumours of the renal pelvis

Dr. H. D. Morse, Winnipeg

Dr. C. B. Stewart, Winnipeg

Dysfunction of the bladder

Surg. Lt. Commander David R. Mitchell,
HalifaxUnusual cases of bladder tumours with a
discussion of treatment

Dr. R. E. Powell, Montreal

Amendments to Constitution and By-Laws

The Committee on Constitution and By-Laws has recently met to consider the instructions received from the Executive Committee respecting representation of Chairmen of Departments upon Council. It is recommended that the Constitution be amended as follows:

1. Article IX—of the Constitution—amend by inserting after (d) a Section (e) "The Chairmen of Departments of the Association" and reletter the remaining sections (f) and (g). The amended article to read as follows:—

Article IX—The General Council

The General Council should consist of:

- (a) The Officers of the Association.
- (b) The President and Secretary or Joint Secretaries of each Branch Association or Division.
- (c) Delegates elected by Branch Associations and Divisions, amongst whom shall be included the members designated by Divisions for the Nominating Committee and the Executive Committee.

Each Branch Association or Division shall be entitled to elect five delegates to serve on the General Council for its membership in The Canadian Medical Association of fifty or less; one additional delegate for its membership from fifty-one to one hundred; one additional delegate for its membership from one hundred and one to three hundred; and thereafter one delegate for every three hundred above three hundred. One of its representatives on General Council may be named by a Division as its nominee to the Nominating Committee of the Association.

- (d) The Chairmen of the Standing Committees of The Association.
- (e) The Chairmen of Departments of The Association.
- (f) Past-Presidents of The Association.
- (g) Two representatives of the Department of Pensions and National Health, who are members of The Canadian Medical Association, one of whom shall be the Deputy Minister of Pensions and National Health.

2. After Article X insert a new Article XI as follows:—

Article XI—Departments

The General Council or the Executive Committee may establish Departments of the Association to administer funds allocated to The Association and designated for a specific purpose.

The Departments of the Association are:

1. The Department of Hospital Service.
2. The Department of Cancer Control.

3. Renumber the remaining Articles as follows:—

Article XII—Funds

Article XIII—The Association Year.

Article XIV—Amendments

Article XV—Provincial Autonomy.

4. By-Laws, after Chapter IX insert a new Chapter X as follows:—

Chapter X—Departments**Section 1.—Duties of the Department of Hospital Service.**

- (a) To administer funds allocated to the Canadian Medical Association for hospital service.
- (b) To study community needs with respect to the provision and financing of hospital care.
- (c) To study hospital procedures and developmental trends.
- (d) To build up a reference library on hospital and related topics.
- (e) To make the facilities of the Department freely available in the interest of more efficient hospital service.
- (f) To perform such other duties as may from time to time be referred to it.

Section 2.—Duties of the Department of Cancer Control.

- (a) To administer the funds allocated to the Canadian Medical Association for the purpose of controlling cancer.
- (b) To serve as a co-ordinating centre for the activities of the various Provincial Cancer Committees.
- (c) To consider proposed legislation dealing with cancer, provided such legislation is Dominion and not Provincial in character.
- (d) To play some part in educating the medical profession (not the public) regarding advances in knowledge in the diagnosis, treatment and prevention of cancer.
- (e) To express an opinion, when requested, as to suggested new methods of treatment.
- (f) To advise as to the use of funds which may be donated from time to time for the purpose of advancing our knowledge of cancer.
- (g) To perform such other duties as may from time to time be referred to it.

Medical Societies**Meeting of Montreal Medico-Chirurgical Society**

The Tuberculosis Section of the Montreal Medico-Chirurgical Society held its regular meeting on April 7, 1944. The first paper was by Dr. Howard R. Clouston of Huntingdon, Que., and bore the intriguing title of "This pasteurization fraud". After pointing out that he was born and had always lived and practised in what could be described as the best dairy section in Canada, Dr. Clouston went on to make his point with regard to pasteurization. He felt that pasteurization was a weak link in the chain of circumstances surrounding the production of milk. Pasteurized milk could not be regarded as safe if, after it had been so treated, there was any chance of its contamination, for it was still an excellent culture medium. That there were chances of such contamination Dr. Clouston left no doubt at all in

the minds of his audience. In fact he made it appear that it was bound to be so under ordinary farming conditions. The only thing that really saved the situation he said was the work of the dairy inspectors. It was they who actually were responsible for the milk supply of Montreal being as excellent as it was. But, as he pointed out, there were not inspectors enough and even they had their difficulties to contend with.

Dr. Clouston proposed no specific remedy for the situation. He only asked that we do not rely on pasteurization as an infallible protection to milk. The chain could only be as strong as its weakest link.

The second item on the program was a most interesting film taken by Dr. Albert M. Hamel of the Department of Indian Affairs, of the living conditions amongst some of the Indian tribes in the north. Dr. Hamel has had an extensive medical experience among the various tribes in the Province of Quebec.

The paper of the evening was given by Dr. Cameron Haight of Ann Arbor, Mich. Dr. Haight gave a comprehensive survey of modern surgical methods in the treatment of pulmonary tuberculosis and illustrated his paper with selected cases.

He showed that the results of treatment of pulmonary tuberculosis depend largely on prompt diagnosis, early use of collapse therapy when indicated and the resistance of the patient. The most important of these factors are the early diagnosis and the proper selection of cases for collapse therapy. The discussion centred largely on the indications for collapse therapy and a mention of the methods that are most frequently employed. As the use of collapse therapy and the healing of pulmonary lesions is influenced by the presence or absence of tuberculous ulceration of the bronchi, the use of bronchoscopy for the diagnosis and treatment of tuberculous bronchial lesions was also discussed.

Drs. Rennie Howell and W. E. Kunstler in discussion referred to their experiences in large series of pneumothoraces and pneumolyses.

La Société de Chirurgie de Montréal

Le 17 mars 1944, séance de la Société de Chirurgie de Montréal était tenue sous la présidence du docteur Pierre Smith (en l'absence du docteur A. Bellerose), au Cercle Universitaire de Montréal.

Le docteur Paul Bourgeois a présenté un travail scientifique sur "La lithiase rénale" et le docteur Roland Décarie sur "Le diverticule du duodenum".

J.-ERNEST CABANA,
Secrétaire annuel.

La société médicale des hôpitaux universitaires de Québec

Séance à l'Hôtel-Dieu de Québec, vendredi, le 3 mars 1944, à 8.30 heures du soir.

A PROPOS DE TROIS CAS DE CARDIOSPASME. — François Roy et Jacques Turcot.

Le cardiospasme est une affection dont la cause n'est pas connue et qui se manifeste cliniquement par une dysphagie progressive et radiologiquement par une dilatation de la partie inférieure ou de la totalité de l'œsophage. L'œsophagoscope passe facilement; il n'y a pas de rétrécissement. La musculature s'hyperplasia et après un certain temps, on voit apparaître des lésions de la muqueuse. L'évolution dure plusieurs années et aboutit à la dysphagie complète.

Le traitement, très efficace, consiste à faire des dilatations œsophagiennes, à l'aide d'un ballon de caoutchouc recouvert de soie, dans lequel on introduit de l'air ou de l'eau sous pression, pression égale à une colonne d'eau de 23 pieds. Souvent une seule dilatation suffit. Trois cas illustrent bien ces données: 1er cas: Dysphagie depuis 7 ans. Tous les traitements échouent, même une cardiectomie extra-muqueuse, qui améliore cependant le malade pour huit mois. La dilatation sous forte pression (23 pieds d'eau) fait disparaître tous les symptômes. 2e cas: Dysphagie depuis trois ans aboutissant à un amaigrissement extrême qui nécessite une gastrostomie pour permettre l'alimentation. Les dilatations font disparaître tous les symptômes. 3e cas: Troubles œsophagiens remontant à trois ans et conduisant à la cachexie. On fait au malade une gastrostomie pour le nourrir. Les dilatations, cette fois encore, font merveille.

Conclusions: Efficacité des dilatations: Possibilité de prévenir des interventions chirurgicales et de longues années de souffrance.

TUMEURS CUTANÉES PIGMENTÉES, NON NÉVIQUES. — Carlton Auger.

Dans le groupe des tumeurs pigmentées de la peau, il y a, en plus des tumeurs néviques proprement dites, des tumeurs épithéliales, dont la pigmentation est un phénomène secondaire. Trois lésions verruqueuses pigmentées, deux papillomes pigmentés et quatre épithéliomas pigmentés sont décrits dans ce travail. L'hyperplasie épithéliale au niveau de ces tumeurs s'accompagne d'une hyperplasie des mélanoblastes et d'une surproduction de mélanine. Ceci explique leur coloration noire ou brune foncée. A cause de cette pigmentation, il est difficile de distinguer cliniquement ces tumeurs, des tumeurs néviques vraies. Aussi sont-elles généralement enlevées avec le diagnostic de nœvi.

LE CURARE COMME ADJUVANT DE L'ANESTHÉSIE GÉNÉRALE. — Fernando Hudon.

Plusieurs physiologistes expérimentèrent le curare dans les états convulsifs, mais le manque d'une bonne préparation causa quelques intoxications et retarda son application en clinique. En ces dernières années, la maison Squibb mit sur le marché un extrait purifié de curare sous le nom de "Intocostrin". Le docteur H. R. Griffith de Montréal fut le premier anesthésiste à s'en servir en anesthésie générale pour favoriser le relâchement musculaire avec succès. Nous l'avons utilisé nous-même, deux fois avec l'éther, dix-huit fois avec le cyclopropane et vingt-trois fois avec le pentothal comme anesthésique principal.

Nous l'avons employé avec succès dans un cas de trismus, une œsophagoscopie, une intervention sur les cordes vocales, et dans vingt-trois opérations sur les voies biliaires. Trente unités suffisent généralement pour donner la résolution musculaire. Sa manière d'agir est son action inhibante au niveau des plaques motrices par neutralisation de l'acétylcholine. Son antidote est le prostigmine. L'action apparaît en quelques secondes

pour disparaître en quinze à vingt minutes. Nos constatations furent les mêmes que celles des docteurs Griffith et Cullen.

Au point de vue clinique, nous n'avons pas constaté de signes d'intoxication.

TRAITEMENT DES BRÛLURES.—Jean-Louis Laroche.

Le traitement d'un grand brûlé est difficile en même temps que très important. Le traitement général est aussi important, sinon davantage, que le traitement local. Toujours associer les deux si possible.

Le traitement général se résume à ceci: 1° Plasma par voie intraveineuse, avec contrôle de l'hémoconcentration; 2° Stimulants cardiaques et sédatifs, solutés salins, et glucosés; la quantité à donner peut atteindre parfois 5 à 6,000 c.c. Les sulfamidés pour combattre l'infection; la transfusion sanguine; enfin, une diète appropriée, voilà le traitement général.

Le traitement local a pour but d'éviter l'infection, de diminuer la douleur, et d'activer la régénération de l'épithélium. A cet effet, on emploiera les colorants, les pansements salins, l'acide tannique, la sulfadiazine. Chacun de ces produits a des avantages et des inconvénients.

Il serait important que les services hospitaliers aient à leur disposition tout ce qu'il faut pour traiter, le cas échéant, plusieurs grands brûlés, à l'occasion d'un sinistre, tel que celui du Cocoanut Grove à Boston.

Une séance de la société médicale des hôpitaux universitaires de Québec eut lieu à la Crèche St-Vincent-de-Paul, Québec, le vendredi, le 17 mars, 1944. Le programme suivant était présenté.

FIBROME ET GROSSESSE.—René Simard.

Il faut demeurer des partisans résolus de l'abstention de toute intervention devant le problème créé par l'apparition d'une grossesse dans un utérus fibromyomateux et laisser à la nature le soin de régler ce cas puisqu'elle y réussit généralement si bien. Néanmoins, l'apparition de complications réellement graves nécessite toujours une intervention chirurgicale laquelle consistera au cours de la grossesse en une simple myomectomie; durant le travail, en une césarienne suivie d'hystérectomie; et pendant les suites de couches, en une hystérectomie. L'auteur présente quatre observations de volumineux fibromes compliqués de grossesse. Deux de ces cas se sont terminés heureusement sans aucune intervention, mais les deux derniers ont nécessité une césarienne suivie d'hystérectomie.

AMYGDALITE AIGUE ET MANIFESTATIONS RHUMATISMALES CHEZ LE JEUNE ENFANT.—François Letarte.

Les foyers amygdaliens causent des infections secondaires qui peuvent se manifester au niveau de la peau ou se localiser aux articulations, sur les séreuses et le système nerveux.

Deux observations sont présentées d'enfants de moins de cinq ans qui ont souffert d'amygdalite compliquée de manifestations rhumatismales. L'angine catarrhale et les symptômes des voies respiratoires supérieures ont été accompagnés de signes généraux graves. Les arthropathies sont apparues aiguës et mobiles, mais sans suppuration. Les examens bactériologiques ont isolé le streptocoque viridans et le pneumocoque. L'analyse anatomo-pathologique a prouvé que les cryptes étaient remplies de caséum et de pus. L'amygdale jouant le rôle de "focal infection" est ensuite décrite dans les infections métastatiques qui se localisent sur les articulations. L'amygdale est la porte d'entrée du rhumatisme articulaire aigu.

L'amygdalectomie a guéri les deux malades. Le sulfathiazole a peu modifié le tableau clinique. Le

salicylate de soude a diminué la douleur et la fièvre. L'amygdalectomie totale doit être exécutée en présence d'une seule manifestation rhumatismale, immédiatement après les phénomènes aigus pour prévenir les complications cardiaques et les récidives.

CONTRIBUTION À L'ÉTUDE DE LA PLEURÉSIE STAPHYLOCOCCIQUE CHEZ L'ENFANT DES SIX PREMIERS MOIS.—Euclide Déchéne.

Vingt-six cas de pleurésies purulentes à staphylocoques dorés hémolytiques furent observés à la Crèche St-Vincent de Paul de mai, 1940, à décembre, 1943, chez des bébés de moins de dix mois. Il est à noter: (a) l'âge relativement jeune de ces nourrissons; 88.4% ont moins de six mois; (b) le pourcentage élevé de mortalité: 92.2%.

Une fois le diagnostic de pleurésie staphylococcique posé, le traitement fut le suivant; isolement, tonicardiaques, transfusions, ponctions décompressives répétées, anatoxine staphylococcique et sulfathiazole à bonnes doses. Après maints échecs et de l'avis de la plupart des auteurs, nous avons abandonné la résection costale trop choquante pour la remplacer par une intervention beaucoup plus simple: la pleurotomie. Nous avons tenté cette dernière chez cinq de nos malades plus résistants, une fois la phase aiguë passée, c'est-à-dire après 18 à 21 jours de maladie. Un seul survécut.

La mortalité est très élevée dans la pleurésie staphylococcique chez l'enfant des six premiers mois. Elle est aux environs de 95-100%. Le pronostic de la pleurésie à staphylocoques est extrêmement grave chez l'enfant—et fonction avant tout de l'âge.

Conclusion: le sulfathiazole n'a pas donné les résultats espérés dans le traitement de la pleurésie à staphylocoques dorés hémolytiques. Il est à espérer que la pénicilline aura une action efficace contre la pneumonie à staphylocoques car c'est là en réalité le fond de la question.

LES ACCIDENTS DE LA PREMIÈRE DENTITION.—Donat Lapointe.

Les accidents de la dentition connus depuis le siècle de Périclès, 450 av. J.C., ont suscité chez les médecins des discussions très vives. La dentition a d'abord été considérée comme un facteur presque dominant dans la pathologie du premier âge. Plus près de notre siècle, un courant d'opinions voulait nier en bloc l'existence des accidents de la dentition.

De nos jours, il est admis à peu près généralement que l'éruption des dents peut favoriser l'apparition d'accidents passagers plus ou moins importants.

Ces troubles dits de dentition caractérisés par des douleurs, de l'anoxie, de troubles digestifs etc., paraissent être d'ordre réflexe et survenir électivement chez certains individus à terrain prédisposé.

Bien que la sortie des dents se produise sans fracas chez un très grand nombre de nourrissons, il demeure fortement ancré dans l'esprit des masses que forcément presque tous les enfants doivent présenter à cette période tout un cortège de maladies plus ou moins graves.

"He made his own the thoughts of simple men,
And with the touch that makes the world akin,
A welcome guest of lonely cabin homes,
Found, too, no heart he could not enter in."

Dr. Weir Mitchell of
Dr. W. H. Drummond, Montreal.

Canadian Medical War Services

MEDICAL OFFICERS APPOINTED TO THE R.C.A.M.C. — ACTIVE FORCE FEBRUARY, 1944

(Previous sections appeared in the February, March, May, July, September, November and December 1943, and January, February and March 1944, issues)

SECTION XXIII

Name	Address	Date of Appointment	Name	Address	Date of Appointment	Name	Address	Date of Appointment
Edwards, P. A.,	Montreal	12-1-44	Maddison, G. E.,	Halifax	1-9-43	Strohan, R. E.,	Saskatoon,	
Graham, C. B.,	Toronto	1-2-44	Ranosky, M. J.,	Winnipeg	11-2-44	Sask.		17-1-44
Maxwell, I. D.,	Canadian		Skinner, N. S.,	Saint John,		Winter, H.,	Canadian	
Army Overseas		10-9-43	N.B.		21-2-44	Army Overseas		2-12-43

MEDICAL OFFICERS STRUCK OFF STRENGTH OF THE R.C.A.M.C.—ACTIVE FORCE FEBRUARY, 1944

Name	Address	Date struck off strength	Name	Address	Date struck off strength	Name	Address	Date struck off strength
Aitken, G. W. A.,	London, Ont.	30-1-44	Grondin, L.,	St. Maurice, Que.	15-1-44	Senecal, J. G.,	St. Paul	
Bugis, J.,	Edmonton, Alta.	15-1-44	Neville, J. D.,	Camrose, Alta.	10-12-43	D'Abbotsford, Que.		10-1-44
Dewitt, C. E. A.,	Wolfville,		Riddell, L. H.,	Winnipeg	6-2-44	Wray-Johnston, K. H.,		
N.S.		19-12-43	Ryan, C. A.,	Vancouver	22-1-44	Vancouver		27-1-44

Special Correspondence

The London Letter

(From our own correspondent)

THE WHITE PAPER

Since last month's letter, it is fair to say that the only serious topic of conversation in the medical world has been the Government's proposals for a National Health Service. There was a two-day debate in both Houses of Parliament and meetings are being held all over the country, organized by the British Medical Association both for members and non-members. A detailed questionnaire running to thirty questions, has been circulated to every registered medical practitioner in order to ascertain the exact views of the medical profession.

Criticism seems to crystallize in several directions. The question of any compulsion as regards place or terms of service has been answered to some extent by authoritative reassurance by Government spokesmen. Nevertheless the doubt still remains.

Next the composition of the Central Authority is criticized. It is felt that the professional body which directs and advises should be largely elected. The same sort of criticisms apply to the Local Authority Bodies, and as regards the voluntary hospitals, perhaps the greatest storm centres round what is held to be an attempt to get services for less than cost.

It was said last month that the White Paper has been given a cautious welcome. Since then, the second stage of what may be termed outspoken resentment at threats of change, has set in. This is a natural phenomenon and may well pass to the next stage of reasoned criticism and negotiation within the next few months. What nobody knows is exactly what the general public feels about it all.

WOMEN DOCTORS

For some time there has been a smouldering criticism of the fact that the majority of the medical schools attached to the teaching hospitals in London, afforded no facilities for women students. The matter has been brought to a head by a decision by the Senate of London University that in the future all London medical schools should be open on equal terms to the two sexes. It is unlikely that anything can be done at once and, in fact, it remains to be seen whether the two schools that take women only, will consider throwing open their doors to men. There is also the problem of just what is the demand for women doctors throughout the country. It would be obviously absurd to do anything to increase the number of women who qualify unless it is clear that there is work for them to do. But for both sexes, there is a strong case for medical co-education and it will be interesting to see how London copes with this problem.

CARE OF THE AGED

Statisticians have been pointing out that not only is the birth rate decreasing but that the population is becoming weighted by an increasing number of old people. One of the primary objects specified when the Nuffield Foundation was announced was concerned with this problem. It has recently been stated that a survey of the problems of ageing and the care of old people, is to be undertaken. A survey committee with medical and lay members has been set up with a special medical research sub-committee as soon as sufficient information has been collected and collated. The Nuffield Foundation will be able to decide on future action.

INDUSTRIAL MEDICINE

The term "Comprehensive Medical Service" has been rather explained away, for the Government's proposals leave several aspects of medicine in this country right outside the National Health Service. Among these comes industrial medicine and it is a source of disappointment to many that this rapidly developing branch should not have been much more closely linked to the general trend of medical progress.

Meanwhile, the British Medical Association has sponsored the publication of a new journal which will deal with the problems of medicine in industry. *The British Journal of Industrial Medicine* owes its origin primarily to the activities of the Association of Industrial Medical Officers formed in 1935 for bringing medical men who were working in industry together. The general development of industry in this country is mainly in the shape of small firms who would not be able to employ a whole-time workers' doctor and it is therefore to the general practitioner that industry must look for most of its medical service. This new journal will serve to assist the industrial doctor and will also supply specialist information for these whole-time industrial medical officers who will in fact be the consultants in that branch of medicine.

ALAN MONCRIEFF.

London, April, 1944.

Victory has to be paid for and won. There can be true freedom only when it is earned, deserved. Buying Victory Bonds is the one way in which every Canadian citizen can and should help to assure both.

Abstracts from Current Literature

Medicine

Genealogical and Clinicopathological Study of Pick's Disease. Malamud, N. and Waggoner, R. W.: *Arch. Neurol. & Psychiat.*, 1943, 50: 3.

Pick's disease, as exemplified in the two families described here, shows a definitely dominant pattern of inheritance. Thus, in both families, after the defect once made its appearance it was regularly inherited by some of the offspring of an affected parent, and not by the offspring of two normal parents. In the pedigree of one family, the first presumptive appearance of the defect was in one member only of a large sibship. This appearance of the disease may be explained as a new mutation unless it can be proved that the defect was already present in some of the antecedents (persons with "senile dementia"). Of the four offspring of this originally affected person, the defect appears in 2, which is the usual Mendelian ratio of 1:1 for a dominant trait. In the pedigree of the other family the heterozygotic defect appeared in 12 of the 25 offspring of affected parents who had reached the age at which the disease might be expected to develop. The fourth generation of this family is too young to determine whether any are afflicted, although 2 members show possible incipient signs of the disease; their ages are unknown. A dominant inheritance of the disease has also been assumed by Sanders and associates in their family.

It is of special interest to note that the age of onset of the disease differed greatly between the two families, but was fairly constant within each. In the one family the age of onset was at about the middle of the third decade, while in the other family it was between the ages of 50 and 65 and showed a tendency toward an earlier onset in successive generations. This phenomenon is also confirmed in the literature and is commonly observed with other hereditary disorders.

There does not appear to be any significant sex linkage. Although the total number of females affected in the second family was considerably greater than the number of males, a glance at each sibship will show some in which more females and others in which more males were affected, while 3 affected sibships consisted only of females. This observation is also confirmed by the literature.

Since so-called sporadic cases of Pick's disease are frequent, the opinion has been advanced that while in some cases the condition is hereditary, in others it may have a non-hereditary cause.

In addition to the specific hereditary factor, Pick's disease is often associated with a general familial stigmatization by other degenerative and constitutional mental disorders.

MADGE T. MACKLIN

Meningococcic Infections; Report of 43 Cases of Meningococcic Meningitis and 8 Cases of Meningococcaemia. Webster, S. H., et al.: *Ann. Int. Med.*, 1944, 20: 12.

Certain pertinent features of 43 cases of meningococcic meningitis and of 8 cases of meningococcaemia occurring in a period of two years beginning in September, 1940, are presented. There were 9 deaths among the former, and none among the latter: 16 cases occurred in the first year and 35 in the second.

Any one or more of the characteristic findings of meningococcic meningitis may be absent in any given case. A tentative diagnosis of meningococcic meningitis can be made in almost every instance by examination of a Gram-stained smear of the cerebrospinal fluid or its sediment. Group II meningococcus should be carefully distinguished from the gonococcus especially in cases in which the organism is recovered

only from the blood. Group II infections predominated in the first year and Group I in the second.

All except two of the cases with meningitis who recovered showed objective signs of clinical improvement 24 hours or less after chemotherapy. The initial dose of sulfonamide should be administered intravenously to cases of meningitis, even if they appear only moderately ill when first seen.

Patients with a relative bradycardia, even though they appear only moderately ill on admission, should be observed closely for evidence of increased intracranial pressure. Lumbar puncture still has a place in the therapy of meningococcal meningitis for diagnosis and for the relief of symptoms of increased intracranial pressure. Normal cerebrospinal fluid sugar values obtained after the use of sulfonamides or of parenteral glucose therapy are of no value by themselves in estimating the progress of the disease.

Pulmonary involvement is quite frequent in the course of meningococcal meningitis. It probably represents a local infection by the meningococcus, either alone or with other organisms. Pneumonia due to the meningococcus may occur in the absence of meningitis, but such cases were not recognized in the present series. S. R. TOWNSEND

Thiocyanate Goitre in Man. Rawson, R. W. *et al.*: *Ann. Int. Med.*, 1943, 18: 829.

Thiocyanate toxicity is characterized by (1) hyperplasia of the thyroid; (2) low basal metabolic rate; (3) symptoms of hypothyroidism; (4) exophthalmus; (5) low blood iodine; (6) decreased urinary excretion of labelled iodine; (7) increased urinary excretion of thyrotropic hormone in the inactivated form.

The theory is advanced that this drug blocks the formation of thyroid hormone by the thyroid, and that the consequent lowering of concentration of active thyroid hormone in the blood stream causes stimulation of the anterior pituitary to produce an excess of thyrotropic hormone. This in turn causes thyroid hyperplasia, but because of the block, no increase of physiologically active thyroid hormone output.

Thiocyanate goitre can probably be prevented by prophylactic doses of iodine; and can be relieved by the administration of thyroid, even when the administration of thiocyanate for hypertension is continued. S. R. TOWNSEND

Surgery

Atraumatic Amputation through the Lower Thigh in Peripheral Vascular Disease. "Amputation non traumatique au tiers inférieur de la cuisse dans les maladies vasculaires des extrémités." Pearl, F. and Misrack, M.: *Surg., Gyn. & Obst.*, 1943, 77: 354.

Depuis 1935, les auteurs pratiquent l'amputation de la cuisse au-dessus des condyles dans les cas de lésions vasculaires périphériques.

Les avantages seraient les suivants: (1) Inutilité de l'emploi du garrot ou tourniquet. (2) Conservation du fascia de la région poplitée, barrière protectrice contre l'infection. (3) Aucune section des masses musculaires. (4) Possibilité de conserver des lambeaux cutanés viables et de grandes dimensions. (5) Fermeture du moignon n'intéressant que la peau et le tissu cellulaire sous-cutané, qui se réalise alors sans tension et permettant un drainage plus efficace. (6) Un moignon plus long, plus mobile, avec une surface de portée ou d'appui à l'extrémité. (7) Choc opératoire moindre. (8) Possibilité d'asseoir le malade dans sa chaise dès le lendemain de l'opération.

Le travail des auteurs est basé sur 36 amputations, dont 15 d'après le procédé de Callender et 21 d'après la modification apportée par Pearl. Les auteurs après des considérations générales sur les lésions vasculaires des extrémités, associées ou non à l'infection ou au diabète, donnent une analyse détaillée de leurs cas observés et traités: analyse clinique et résultats

opératoires immédiats et ultérieurs, et font remarquer que les 5 cas de mortalité traduisent un résultat d'ensemble supérieur à ceux obtenus jusqu'à ce jour par les autres méthodes.

En conclusion, les auteurs soulignent notamment que la sympathectomie lombaire pratiquée à la période où existe encore une vaso-constriction satisfaisante est le moyen le plus sûr d'accroître la circulation périphérique et de prévenir l'amputation. PIERRE SMITH

Spreading Osteomyelitis of the Frontal Bone Treated with Penicillin. Williams, H. L. and Nichols, D. R.: *Proc. Staff Meet. Mayo Clinic*, 1943, 18: 467.

Two cases are presented. Of the two cases of spreading osteomyelitis of the frontal bone in which a favourable result apparently was obtained by the administration of penicillin, the first case is the second of two cases seen at the clinic in which a pure culture, hæmolytic staphylococcus aureus, was found. The second case is a typical example of the malignant course run by this disease process. S. R. TOWNSEND

The Use of Methedrine in Surgical Operations. Dodd, H. and Prescott, F.: *Surg., Gyn. & Obst.*, 1943, 77: 645.

No entirely satisfactory drug has been generally available to counteract the serious falls of blood pressure, unaccompanied by severe reduction of blood volume, that often occur during operations. Adrenalin and ephedrine used intravenously are dependable but have a short-lived effect. The more recent pholedrine can be used intramuscularly with effectiveness but its effect lasts rarely more than 45 minutes.

The authors believe that an ideal pressor agent has been found and proved in the recently available drug methedrine. It has a reliable and sustained reaction and can be administered by any route under average clinical conditions.

The authors are convinced that there are fewer postoperative complications of all kinds, and fewer funerals, from operations during which blood pressure was maintained at normal levels than from those during which low levels were allowed. In the latter the lessened bleeding is an advantage but not a justification.

Methedrine acts in man by vasoconstriction of the peripheral vessels. In larger doses it is a cardiac stimulant. In doses of 15 milligrams or more it causes an increase in the rate and depth of respiration. Taken by mouth it has an effect on the cortex similar to benzedrine. Doses as large as 70 milligrams parenterally have no toxic effects.

A single dose for intramuscular injection varies from 15 to 30 milligrams; for intravenous injection from 10 to 20 milligrams. In 97% of cases the blood pressure is restored from 80 mm. systolic to normal, usually by a single injection, and is maintained at normal for from ½ hour to several hours. Repeated smaller doses are less effective. A large dose of 20 mgm. intravenously combined with 20 mgm. intramuscularly can be used with safety. A large dose remains effective when repeated.

Clinically methedrine is considered to be superior to other pressor agents. J. R. LACROIX

Obstetrics and Gynæcology

Vesicovaginal Fistula. Murray, H. E.: *J. Obst. & Gyn. Brit. Emp.*, 1943, 50: 347.

Below is the record of 65 cases in which both ureters were transplanted. In 61 of these cases the operation was in two stages, in 5 in one stage.

Etiology: (a) Congenital, 2 cases. (b) Traumatic (accidental), nil. (c) During labour, normal pelvis: confinement with instruments, 7 cases. Without instruments but prolonged labour, 11 cases. *Contracted pelvis:* confinement with instruments, 13 cases. Without instruments but prolonged labour, 20 cases. (d) As a result

of operation (following operation for elephantiasis vulvæ, performed in a district hospital), 1 case. (e) Following radium therapy for carcinoma of cervix, nil. (f) Due to carcinoma of cervix, bladder, and vagina, nil. (g) Cause not traceable, 11 cases.

Results: Cured, 51 cases (78.5%); death, 14 cases (21.5%). Out of 14 deaths 3 occurred after transplantation of both ureters in a single sitting. Excluding these 3, there is a death-rate of only 11 in 61 cases, a percentage of 16.4. A little comment is necessary on the high death-rate after the one-stage operation. Indian patients generally display little resistance to a serious, and above all prolonged, operation, no matter what the anæsthetic may be. The author's cases were given ether, chloroform, gas and oxygen, spinal anæsthesia, according to choice and state of the patient. Of 65, 49 had a fistula following difficult or delayed labour. The majority of patients, though young, suffer severely during the puerperium. They become easy victims to tropical fever or helminthic disease. Mental worry, inferiority complex, privation, general ill-health, climatic conditions, and malnutrition, all play their parts and take their toll. In our series 33 were multiparæ, of which 11 had a history of repeated stillbirths. In 8, local repair (vaginally), was attempted, but in 2 cases there were recurrences (following childbirth) which proved irreparable. In 6 cases local repair failed in spite of the utmost care, and in these operative interference was deemed inadvisable.

P. J. KEARNS

The Harmful Influence of Pregnancy on Advanced Tuberculosis as Modified by Collapse Therapy.
Cutter, J. W.: *Am. J. Obst. & Gyn.*, 1944, 47: 1.

Childbearing should be looked upon as a potential hazard for a tuberculous mother. Collapse therapy has definitely lessened this risk. If the disease, though advanced, is limited to one lung and the diseased area is anatomically well collapsed with all cavities closed, the sputum free of tubercle bacilli, and the collapse maintained throughout pregnancy, one or more pregnancies may safely be undertaken. The same is true if there is advanced tuberculosis in both lungs, but with the disease in each lung controlled with adequate collapse therapy. If there is disease in both lungs, and only one lung is treated with collapse therapy, the disease in the uncollapsed lung, though quiescent before pregnancy, may become active in approximately 30% of cases. In about half of this number, collapse therapy may be necessary to control the reactivated disease in the untreated lung.

The possibility of reactivating quiescent tuberculosis in an uncollapsed lung, however, is not in itself a contraindication to pregnancy. Permission may be given as long as the patient is under observation and is willing to accept collapse therapy when indicated.

Pneumothorax therapy may be considered as an alternative to therapeutic abortion in active tuberculosis first recognized during the early months of pregnancy. Only collapse therapy which produces adequate localized collapse of the diseased portion of the lung will prevent reactivation. Inadequate collapse therapy may be considered the same as if no collapse therapy had been employed. The majority of such patients with advanced disease do poorly and pregnancy is inadvisable.

ROSS MITCHELL

Surgical Problems Arising During Pregnancy. Child, C. G. and Douglas, R. G.: *Am. J. Obst. & Gyn.*, 1944, 47: 213.

Pregnant women tolerate even major surgical procedures quite as well as the non-pregnant. When surgical disease, however, becomes complicated by peritonitis, the outlook is unfavourable, and the maternal and fetal mortality high. Ovarian tumours complicating pregnancy may be removed with relative impunity provided operation can be postponed until after the first trimester. Myomectomy should not be

performed during pregnancy except upon urgent indications.

An exploratory celiotomy for suspected ectopic pregnancy may be performed with relatively little danger of interrupting a normal intrauterine pregnancy should the preoperative diagnosis fail to be substantiated.

ROSS MITCHELL

Neurology and Psychiatry

Myasthenia Gravis. Riley, H. A. and Frocht, M.: *Arch. Neurol. & Psychiat.*, 1943, 49: 904.

There is a wide difference of opinion among writers as to whether heredity plays any rôle in causing myasthenia gravis, some asserting that the condition is not hereditary, others that it occasionally is. These authors report the instance of 2 sisters in a family of 8 (3 brothers and 5 sisters), being affected at the ages of 8 and 11 respectively. They complained of fatigue, of drooping eyelids, of diplopia. The reaction of Jolly was positive in one, and only mildly so in the other. Both showed temporary improvement, although of short duration, following the injection of prostigmine methyl sulphate. The family were Polish Jews and there was a history of diabetes, cardiac disease, and hypertension.

NOTE: At least 4 other familial instances have been reported: Hart (2 sisters), Marinesco (2 sisters), Rothbart (4 brothers), Strickroot *et al.* (mother and daughter).

MADGE THURLOW MACKLIN

Rehabilitation of Epileptic Service Men. Lennox, W. G.: *Am. J. Psych.*, 1943, 100: 202.

The author reports that in the United States Army in 1940, next to schizophrenia, epilepsy was the most frequent medical cause for discharge from the army. The war has greatly increased the number of traumatic epileptics. Genetic (essential) epilepsy may have its onset after the man is inducted into service. Thousands of cases will develop spontaneously or after some relatively unimportant incident such as excessive fatigue or emotional trauma. Epilepsy may of course also result directly from participation in war and in brain injury. In a small minority of cases brain injury has been so serious that physical or mental impairment and the frequency and severity of seizures make institutional care necessary. For the persons who require no neurosurgery the treatment must be the maintenance of good physique and determination of the most effective anticonvulsive drug. The patient's medical future will depend in large measure on the guidance and direction of an informed and interested civilian physician. The use of dilantin sodium has greatly improved the outlook for successful drug therapy of many patients. Correct psychological and social treatment of a person subject to seizures is not possible unless he can be usefully employed. The terms rehabilitation and employment are nearly synonymous. While hazardous employment situations must be avoided, certain industries contain many safe jobs for these patients. In the Ford Motor Company 10% of the employees are physically handicapped and this number includes 135 epileptics. In the rehabilitation of the epileptic service man proper medical, psychological and social treatment is important, employment is essential.

BARUCH SILVERMAN

Psychoses Occurring in Soldiers During the Training Period. Hitschman, M. and Yarrell, Z.: *Am. J. Psych.*, 1943, 100: 301.

This article deals with the examination of 100 soldiers admitted to the psychiatric division of Bellevue Hospital in New York between January, 1942, and January, 1943. All of these men had received a certificate of disability discharge. The majority of the soldiers were sent directly from Army hospitals. One-third had enlisted; two-thirds had been drafted. Only one had been in combat and he had

been returned from Hawaii. Seventy-eight were schizophrenic, 8 were manic-depressive, of whom 6 were in the depressed phase and 2 were in the manic phase; 6 were cases of psychopathic personality; 4 were psychoneurotic; 1 was mentally defective, and 1 was epileptic. There were 2 cases of syphilis of the central nervous system. Thirty-one of the men had previous psychiatric treatment and of these 17 were readmissions to Bellevue Psychiatric Hospital. Excessive alcoholism or mental illness occurred in the immediate families of 32 men.

On the basis of this study the following conclusions were made. Men who had previous hospitalizations for mental illness and those showing other signs of maladjustment prior to induction tended to break down after a longer period of military service in contrast to men whose pre-induction adjustment was adequate. Army life provides precipitating factors which react upon a predisposed individual. However, certain situational factors provide an occasion to bring abnormal behaviour more closely to the attention of supervising personnel and thereby contribute to the detection of mental symptoms. It was shown that the incidence of schizophrenia in men during military service and in civilian patients of the same age-group was about equal. These findings applied to first attacks as well as recurrences. No qualitative difference in the psychoses of civilians and soldiers was found.

BARUCH SILVERMAN

Therapeutics

The Therapeutic Value of Testosterone Propionate in Angina Pectoris. Levine, S. A. and Likoff, W. B.: *New Eng. J. Med.*, 1943, 229: 770.

The authors note that previous reports on the use of testosterone propionate in the treatment of angina pectoris have been uniformly favourable and they report its use in a further series of nineteen patients. The dosage used was 25 mgm., intramuscularly, thrice weekly for four weeks (seven weeks in one case). Results were evaluated on the patient's estimation of the amount of physical activity he was able to perform without bringing on an attack of pain, and the number of nitroglycerin tablets necessary over a twenty-four hour period.

These observations were recorded at the beginning, during, and at the conclusion of the injections. They were again noted from one to fifteen months later and the degree of improvement classified as marked, moderate and questionable. Marked improvement was noted in five of the nineteen patients, but two of these five reverted to their former clinical state in six to eight weeks, and one obtained no relief from a later series of injections. Of the remaining two of these five, one maintained the improvement for four months, the other for one month. Moderate improvement was seen in one case, but a coronary occlusion likely had taken place prior to treatment. Questionable results were obtained in two patients, but in only one was improvement maintained.

NORMAN S. SKINNER

Treatment of Addison's Disease with Pellets of Desoxycorticosterone Acetate. Shipley, R. A.: *Am. J. M. Sc.*, 1944, 207: 19.

The authors report that five of a series of seven patients with Addison's disease were well maintained for from 7 to 40 months by pellets of desoxycorticosterone acetate placed under the skin in the infra-scapular region. Four or six pellets were inserted at one side at one time. The effective life of the 75 mgm. pellet was 9 to 10 months, the average daily absorption being 0.21 mgm. per pellet. No local irritation occurred. Two patients could not be controlled by this method of therapy, nor were they controlled by parenteral injections. Both of these patients died from the disease.

The authors warn against fasting by patients under treatment, as they are likely to be thrown into a state of hypoglycemia. Overdosage of the drug is controlled by the removal of one or more pellets. During an infection additional therapy may be required. This is usually given by means of parenteral injections.

E. S. MILLS

Penicillin in the Treatment of Experimental Relapsing Fever. Heilman, F. R. and Herrell, W. E.: *Proc. Staff Meet. Mayo Clinic*, 1943, 18: 457.

The spirochætal infection, relapsing fever, has occurred from time to time throughout the world. It is frequently an endemic disease, but under certain conditions may become epidemic. The louse-born epidemic forms of the disease are likely to occur under conditions of overcrowding, filth, and poverty. Millions of people have been victims of this disease, especially under conditions imposed by war and immigration. While arsenical therapy is satisfactory in the treatment of relapsing fever, its use is not without certain hazards and it leaves something to be desired. In the present study, overwhelming infection due to a strain of spirochæta of relapsing fever, *Borrelia novyi*, has been satisfactorily controlled in experimental animals by using penicillin. It is hoped as a result of these studies that a more effective agent for the treatment of relapsing fever will be made possible in the form of penicillin.

S. R. TOWNSEND

Pathology and Experimental Medicine

Hypoproteinemia. Wilensky, A. O.: *Arch. Surg.*, 1944, 48: 36.

This extensive communication deals with the increasing importance of the proteins and protein metabolism in medicine, especially in surgery, and the relationship of hypoproteinemia to apparent and to latent parenchymal disease.

The author reviews protein metabolism, the renewal of plasma proteins, protein enrichment of the liver, physiology of the proteins, protective effect of proteins on the liver, clinical hypoproteinemia, general pathological changes due to hypoproteinemia, effect of hypoproteinemia on healing of wounds, reversal of the albumin and globulin ratio in clinical conditions and treatment of hypoproteinemia. He infers that a low concentration of plasma protein should be taken as a clinical indication of a profound nutritional disturbance and of a general metabolic deficiency disease.

This may be a primary condition or one secondary to serious disease, especially of the hepatic parenchyma. The importance of plasma proteins for clinical purposes lies in the fact that they can be measured. In clinical practice a single determination is not of much value. A succession of observations is immensely valuable because it indicates the course of the illness, primarily, in the deterioration or the improvement of the protein function and secondarily in the damage to the liver cells. In view of the present tendency to diet, one should appreciate the fact that this may produce a state of under-nutrition, protein deficiency and hypoproteinemia, the symptoms of which perhaps little understood until now, include (1) loss of weight and strength; (2) loss of stamina or energy; (3) various degrees of chronic fatigue, and (4) much lessened resistance to disease.

The Starling hypothesis has helped to explain many clinical conditions previously not so well understood. Sufficient available protein helps to maintain a normal osmotic pressure in the blood stream and in the capillary bed. Protein deficiencies are now thought to have important clinical bearings in the immediate postoperative period after severe burns and injuries in that they bring about states of shock and collapse,

cause a more or less large reduction in the amount of urine excreted, and cause states of hæmoconcentration, abdominal distension, and, occasionally, obstructive manifestations.

G. E. LEARMONTH

The Mechanism of Release of Colloid and the Significance of the Specific Crystalline Substance Demonstrated in the Thyroid Gland Histologically.
Popoff, N. D.: *Arch. Path.*, 1943, 36: 587.

Unlike the other endocrine glands, the thyroid stores its secretion within its follicles. The discharge of this follicular content into the circulation is, moreover, an independent process and is known not to be synchronous with the production and secretion of that content into the follicles. It is often difficult, accordingly, to evaluate the histological state of the thyroid gland in attempting to explain the clinical signs of thyroid disease. In an effort to elucidate the fundamental process by which the active hormone is formed, mobilized and thrown into the circulation, the ways in which the active and inspissated colloids are removed from the follicles, the nature of the so-called postoperative storm, and other aspects of the "thyroid problem", Popoff made use of certain newly devised methods of fixation and of staining.

His material consisted of 62 fresh human thyroid glands obtained surgically, together with the glands of some 50 rabbits and 18 guinea pigs. He was able to demonstrate histologically that normal active, colloid is released by way of intercellular canaliculi; while unused, old central, colloid is re-absorbed by the epithelial cells which, in these stagnating acini, are usually of the cuboidal type. The demonstration of both colloid-releasing intercellular canaliculi and intra-epithelial secretion granules makes possible the determination of the functional state of the gland at the time of removal.

The demonstration, in relation to surgical trauma, of the presence of an intra-epithelial, intravascular and intra-follicular proteolytic enzyme is discussed with reference to the post-thyroidectomy febrile reaction. Experimental injection of the enzyme produces essentially the same type of reaction. Moreover, the enzyme is precipitable by certain organic dyes and may thus be rendered innocuous. Popoff suggests the possible application of these findings to clinical medicine.

E. S. HINDS

Hodgkin's Disease. Steiner, P. E.: *Arch. Path.* 1943, 36: 627.

The author is concerned with the lymphogranulomatous lesions found in the bone marrow in Hodgkin's disease,—their incidence, distribution, and nature—because of the obvious interest of such lesions to diagnostician, roentgenologist, surgeon and pathologist alike. To a brief review of the literature on the osseous lesions in Hodgkin's disease, Steiner adds his own observations and conclusions.

The accepted incidence from clinical observation of osseous involvement is approximately 8%. Post-mortem findings, however, give the higher figure of 28%, with the vertebra, pelvis, rib, femur, sternum and skull shown to be the sites of predilection. Steiner's work on random sampling of the bone marrow for microscopic study in 14 consecutive cases of Hodgkin's disease indicates a much higher incidence. He observed lesions in 11 of the cases or 78.6%. Of the 62 sections examined, 38 (61.2%) showed lesions. The order of frequency of involvement of the various bones differs somewhat from the accepted list. This, however, Steiner believes to be of little importance, as he is of the opinion that *all* bones would show lesions, if complete examination were made.

Of special interest is the author's discussion of the relation in Hodgkin's disease of the symptom of pain and the finding of anæmia to the widespread marrow lesions. The first he accounts for as "bone pain" in many instances, even though the lesions be not

demonstrable radiologically. The anæmia, however, remains a problem. The marrow involvement is not sufficient in the gross to suggest the easy answer of "displacement". Related to this is his judgment that sternal puncture is of little diagnostic value. The mathematical chances of obtaining the specific tissue by such puncture are much too low in the light of his finding of a "miliary" distribution of the lesions.

Toward the solution of the fundamental enigma of Hodgkin's disease, Steiner offers the observation that the distribution of the lesions resembles more closely that of the reticulo-endothelial system.

E. G. HINDS

Hygiene and Public Health

"Cold Vaccines" and the Incidence of the Common Cold. McGee, L. C., Andes, J. E., Plume, C. A. and Hinton, S. H.: *J. Am. M. Ass.*, 1944, 124: 555.

The substance of this paper is given in the accompanying table.

SUMMARY OF EXPERIENCE WITH COLD VACCINES
(October-April, 1941-42 and 1942-43)

	No. of persons in group	No. of colds per person	No. of working days lost per person from colds	No. of days lost per cold
Vaccine, subcutaneous (Sharp & Dohme).....	288	0.66	0.82	1.25
Vaccine, subcutaneous (Parke-Davis).....	94	0.88	2.1	2.38
Placebo, subcutaneous.....	89	1.39	0.47	0.34
Vacagen.....	334	0.65	0.65	1.00
Entoral.....	121	1.98	0.92	0.46
Oravax.....	198	0.96	0.37	0.39
Placebo, oral.....	239	0.69	0.60	0.88
Untreated control.....	228	1.25	0.50	0.40

FRANK G. PEDLEY

Studies on Trichinosis. Wright, W. H., Kerr, K. B. and Jacobs, L.: *Pub. Health Reports*, 1943, 58: 1293.

In an effort to obtain a random sample of the population of the United States from which to estimate the amount of infestation with *Trichina spiralis*, officers of the United States Public Health Service solicited

	Number of diaphragms examined	% of diaphragms positive
1. Base (10 hospitals in Washington, D.C.).....	3,000	16.3
2. Diaphragms from states in which clinical trichinosis had never been reported.....	200	17.5
3. Diaphragms from persons suffering sudden death.....	283	17.0
4. Diaphragms selected at random from hospitals selected at random.....	1,125	18.3
5. Diaphragms selected from persons residing on farms or in villages.....	295	12.2
6. Diaphragms from residents of Washington State and Oregon State.....	210	19.5
7. Diaphragms from orthodox and unorthodox Jews.....	200	0.5
Total.....	5,313	16.1

the co-operation of hospital pathologists in 189 hospitals in 37 states and the District of Columbia. These pathologists were asked to send portions of the diaphragms from routine autopsies of persons over 1 year of age. If the total number of autopsies per year was less than 200 the diaphragm of every second autopsy was requested. If the number of autopsies exceeded 200 the ratio of 1 to 2 was increased proportionately.

All diaphragms were examined by two methods: (1) a direct microscopic examination and (2) the Baermann technique. In the opinion of the authors these two methods should be used in such a study, since the error of each is considerable. The direct microscopic method may miss light infestations with living trichina and the Baermann method of digestion will miss some infestations with dead larvae.

The material received was divided into several classes for purpose of analysis as the preceding table will indicate.

FRANK G. PEDLEY

Obituaries

Dr. George Alexander Brown, one of the oldest practising physicians in Montreal, died on March 22 in the Royal Victoria Hospital, Montreal, after a brief illness. He was in his 78th year.

Born in Charlottetown, P.E.I., the son of George A. Brown and grandson of George Coles, one of the Fathers of Confederation, Dr. Brown obtained his B.A. degree at Windsor College, N.S., and graduated in medicine from McGill University. He interned in the Montreal General Hospital and 56 years ago began to practise in Montreal, specializing in tuberculosis.

Dr. Brown was a member of the University Club and the Faculty Club. He leaves two sons, Basil and William, both of New York; a daughter, Mrs. Helen Blatch; a grandson, Lieut. George Ekers, now overseas with the Canadian Grenadier Guards; six granddaughters, Mrs. Arthur Vineberg, Mrs. Garner Currie, Mrs. William Bowen, Mrs. Colin McDougall, all of Montreal, and the Misses Beverly and Patricia Brown, of New York; and four great granddaughters. A sister, Mrs. Lionel Ekers, died last year.

Dr. Francis Xavier Comeau died at his home at Caraquet, N.B., on April 3, 1944. Dr. Comeau graduated in medicine from the University of Victoria College in 1887 (University of Montreal) and has practised since in New Brunswick. He was the oldest actively practising physician in New Brunswick and was 82 years old. Dr. Omer Comeau, of Rogersville, is a son.

Dr. Isaac Herbert Davidson died in the Winnipeg General Hospital on March 30. Born in St. Philippe, Que., 67 years ago, he came to Manitoba as a child, and graduated from Manitoba Medical College in 1903. For 26 years he practised at Manitou, then for 12 years was chief anaesthetist at St. Boniface Hospital. Later he occupied a like post at Deer Lodge Military Hospital. He is survived by his widow, two sisters and six brothers, one of whom is Dr. J. R. Davidson, of Winnipeg.

He was an able anaesthetist and enjoyed the esteem of his confrères.

Dr. William Duncan Dixon, of Stettler, Alta., known as the "flying doctor", passed away on March 8, 1944, in his 62nd year. Born in Dublin, Ireland, he came to Canada as a child. He graduated in medicine from Manitoba University in 1909, and went to Kindersley, Saskatchewan, where he located for over 10 years, when he opened an office in Calgary, where

he practised until 1931, when he went to Stettler. With his Irish blood, when he wanted to do post-graduate work, he returned to Dublin where he took an Irish degree of Licentiate in Medicine. He left his widow, two daughters and one son to mourn his loss.

Dr. Wilfrid Goldstein. A medical practitioner in Toronto for 14 years, Dr. Goldstein, aged 37, died on March 16 at his home. Born in Acton, Ont., Dr. Goldstein received his early education in Hamilton, Ont., graduating in medicine from the University of Toronto in 1930. He was on the staff of Mt. Sinai Hospital, and was known for his voluntary services among the poor. He was a member of the McCaul St. Synagogue and B'nai B'rith.

Surviving are his widow, Yetta Goldstein; a son, Mervin, of Toronto; his parents, Mr. and Mrs. Benjamin Goldstein, of Hamilton; four brothers, Lt. Morris Goldstein, M.D., of Chicago; Capt. Maxwell Goldstein, U.S. Army; Sam and Irvin, both of Hamilton, and two sisters, Mrs. Fred Lepofsky and Mrs. Joseph Nash, both of Toronto.

Dr. Lorne MacDonald Gray, aged 38, formerly on the staff of the University of Toronto, died on March 12, at Hamilton following a prolonged illness.

He was the son of Mr. and Mrs. Joseph Gray, now of St. Williams, Ont., and received his early education in Toronto. Graduating from the University of Toronto in 1934, he took postgraduate work under Prof. William Boyd, professor of pathology, and later studied in Boston, Mass. He was appointed assistant professor of pathology at the University of Alabama, and while occupying this position was taken ill and returned to Canada.

Surviving besides his parents are a brother, Dr. Kenneth G. Gray, of Toronto, and a sister, Mrs. John Dale, of Petrolia, Ont.

Rev. Dr. Ebenezer Hooper, the first medical superintendent of Kingston General Hospital, died on April 1, aged 97. He was a veteran of the Northwest Rebellion.

Born in London, Eng., Dr. Hooper came to Canada in 1868, first settling near Arthur, Ont. In his younger years he was a lay preacher, and after graduation from Woodstock College, was ordained a minister in the Baptist Church in 1874. He held pastorates in Beamsville, Oshawa and Kingston.

Later, Dr. Hooper took up the study of medicine at Trinity and Queen's Universities, graduating from the latter in 1885. He served with a Kingston regiment in the Northwest Rebellion with the rank of surgeon-major. Taking postgraduate work in London, Eng., he received the diploma of L.S.A.

He resigned the position of medical superintendent of Kingston General Hospital to become pastor of Beverley Street Baptist Church, Toronto. In 1895 he resumed his medical practice in Toronto and continued until his retirement in 1910.

After retiring as a medical practitioner Dr. Hooper served in a number of interim pastorates in Baptist Churches in Ontario and Quebec, and until a few years ago was a frequent preacher. He came to Toronto three years ago from Brockville, where he had been a resident for some years.

Surviving are a son, Dr. E. Ralph Hooper, of Toccoa Falls, Ga., a daughter, Mrs. Arthur M. Boyd, of Flint, Mich.; three brothers, Jonathan, of Toronto, Dr. David Hooper and J. George Hooper, both in England; five grandchildren and six great-grandchildren.

Dr. Arthur Duncan Irvine, radiologist, of Edmonton, passed away on February 12, 1944, in his 41st year. He was a "man from Glengarry"—took his degree of Bachelor of Science with honours, at McMaster University and his degree in medicine from Toronto University, in 1931. After special training and prac-

tice in radiology, he moved to Edmonton, where he remained until death. He was an outstanding radiologist, and a friend maker. Was Secretary-treasurer of the Canadian Association of Radiologists, Fellow of Radiology of London, England, and a member of the American Board of Radiologists. He is survived by his widow and two small sons.

Dr. Eugene Percival Johns, acting head of the Department of Pathology at the University of Western Ontario Medical School, died suddenly on March 31, of a heart attack a few minutes after Dr. A. R. Routledge, coroner, had telephoned his home to ask him to perform an autopsy on the body of a man killed in an accident.

Dr. Johns suffered the attack shortly before Dr. Routledge had called his home. His wife answered the telephone and told the coroner her husband was ill and receiving treatment from Dr. E. A. Bartram. A few minutes later the pathologist died of the seizure.

For two years prior to October, 1943, Dr. Johns was engaged in cancer research at Kingston, under the Department of Public Health.

Dr. Georges Etienne Mignault, medical director and chief of the tuberculosis department at the Sacred Heart Hospital, Cartierville, and president of the Equitable Fire Insurance Company, died on March 30, aged 63 years.

Dr. Mignault was born at St. Augustin, Que., and started in medical practice in 1906 after graduating from Laval University. A member of the Canadian Medical Tuberculosis Association, of the Société Médicale de Montréal and of the Congrès Français de Médecine de Paris, he was closely connected with the establishment of the Sacred Heart Hospital.

A professor in the Faculty of Medicine at the University of Montreal, he also found time to carry out duties as a member of the Bruchesi Institute and Notre Dame Hospital.

The survivors include his widow, the former Yvonne Laurier; a son, Capt. Jean Mignault, serving in the army; two daughters, Mrs. Jean Marie Nadeau and Mrs. A. W. Grandchamp; and three grandchildren.

Dr. William John Patterson died on April 10 at his home in Montreal West, in his 63rd year.

Born at Sussex, N.B., he attended Mount Allison University, Sackville, N.B., and obtained his medical degree at McGill University in 1906. For the following three years, he was house surgeon at the Royal Victoria Hospital and was appointed clinical assistant in surgery in 1910 and in 1917 named Associate in Surgery (orthopædic). Eight years later, he was awarded the Travers Allen Fellowship to study orthopædies under Sir Robert Jones in London, England, and on his return to Canada in 1926, he became assistant surgeon at the Royal Victoria Hospital. He was also assistant surgeon of the Montreal Shriners' Hospital for Crippled Children.

A Fellow of the American College of Surgeons, he was one of the founders of the Occupational Therapy Centre in Montreal and its president from 1939. Dr. Patterson served in the Royal Canadian Army Medical Corps in the Great War and in the present war was officer in charge of Central Medical Boards of M.D. No. 4 with the rank of major until he retired last year. He was the first president of the Montreal West branch of the Canadian Legion. In 1920, he was appointed health officer for the Town of Montreal West and also school medical officer, appointments he has since held. At the time of his death, he was chief of medical services at the Montreal Locomotive Works, Tank Division.

Interested in curling and golf, he was a past president of the Canadian branch of the Royal Caledonian Curling Club, of the Montreal West Curling Club and of Dunany Country Club.

Besides his widow, formerly Mabel Florence Smith, Dr. Patterson leaves a son, Lieut. Sidney, now overseas with the 17th Duke of York's Royal Canadian Hussars; a daughter, Mrs. S. P. Litchfield; a brother, Dr. George Patterson, secretary of the Canadian Legation in Chungking; and a granddaughter, Sherrell Litchfield.

Dr. Joseph Avila Ranger, well-known physician of the Lakeshore district, died at his home at Valois, Que., on January 22, in his 76th year. Dr. Ranger had been ill only a few weeks. He was born in St. Polycarpe and was educated at St. Mary's College here and at Laval University (1892).

He is survived by his widow; five daughters, Mrs. Adelard Duguay, Mrs. Pierre Lemieux, Mrs. Gerard Tardis, Rev. Sister Paul Avila, and Miss Gertrude Ranger; and six sons.

News Items

Alberta

There will be a meeting early in May, 1944, of the Committee on Specialists of the University of Alberta, to consider the recent applications for standing by members of the profession in Alberta.

The Council of the College of Physicians and Surgeons of Alberta was called for April 19, 1944, in Edmonton, when among other things the following matters came up for consideration: A general revision of fees for the practice of medicine in Alberta. The question of reasonable fees for soldiers' dependents. The problem of health insurance, if and when adopted by the Federal Government. Medical services in outlying places.

The Provincial Association together with the University of Alberta has arranged for a "refresher course" in Edmonton from May 8 to 12 inclusive. Outstanding members of the armed forces, representatives of the American Medical Association, the American College of Surgeons, a specialist from Chicago, together with the University medical staff will constitute the lecturing body. While the work will be of great benefit to the civilian physicians, special emphasis is placed on work for the members of the armed forces. An attendance of over 200 is expected.

This year, as formerly, the Provincial Association is co-operating with the other western provinces in the matter of holding their Convention. The dates set are September 20 to 22, inclusive. The first day will be given over to questions of business, and of policy with a report from the College of Physicians and Surgeons for the past year. The meeting will be held in Edmonton at the Macdonald Hotel.

A special refresher course for airmen in Saskatchewan and Alberta was held recently at the new Colonel Belcher Hospital, Calgary, and was well attended.

While there is a shortage of physicians in civilian practice, the Province of Alberta has not yet entered into the plan suggested by the Federal Government whereby physicians from the forces overseas will take over temporarily, civilian practice. The matter is still under advisement, however.

G. E. LEARMONTH



This homely analogy could describe the physician's lot today. With heavier rounds of hospitals and homes, more office appointments and important wartime activities, time conservation has become a real problem.

In treating menopausal patients, it has been the experience of many clinicians that "Premarin" and "Emmenin" help to solve this problem. These naturally-occurring oestrogens provide effective *oral* therapy for *all* menopausal patients.

"Premarin" conjugated oestrogens (equine)—for alleviation of even the most severe menopausal symptoms.
TABLETS (No. 866)—bottles of 20 and 100

"Emmenin" conjugated oestrogens (placental)—for treatment of the milder menopausal symptoms and for maintenance.
TABLETS (No. 701)—bottles of 42 LIQUID (No. 927)—bottles of 4 oz.

WATER-SOLUBLE • WELL TOLERATED • IMPART A FEELING OF WELL BEING



Supplied with the approval of the Research Institute of Endocrinology,
McGill University, under the direction of Dr. J. B. Collip.

AYERST, McKENNA & HARRISON LIMITED

Biological and Pharmaceutical Chemists • Montreal, Canada

PIONEERS OF ORAL OESTROGENS

British Columbia

The American College of Surgeons held a regional meeting in Vancouver, on April 18, to which the general profession were invited. The program dealt practically exclusively with war medicine and surgery and was a very big one. Clinical and hospital meetings were held. A luncheon was given at the Hotel Vancouver, and a dinner in the evening. Dr. A. B. Schinbein, of Vancouver, Fellow of the College, was in charge of proceedings.

The sympathy of the profession is extended to Dr. C. H. Hankinson, of Prince Rupert, past president of the British Columbia Medical Association on account of the recent death of his wife, whose funeral was held in Vancouver and attended by a great many medical men from various parts of the Province.

We gathered from recent announcements by the Medical Health Officer of Vancouver and members of the City Council that the shortage of nurses for public health work is becoming a serious matter in the area covered by the Metropolitan Health Committee on the Lower Mainland.

A special meeting of the British Columbia Medical Association was held on April 19 to discuss health insurance. The Committee on Economics of the British Columbia Medical Association prepared a very comprehensive brief for discussion. It constitutes a careful digest of many months of work by the Committee.

A movement is on foot to establish a hospital in Burnaby, B.C. This is a large municipality and has no hospital accommodation of its own, but has to depend upon Vancouver and New Westminster. A drive has been started to collect sufficient funds to make a beginning, but it is not intended at present to undertake any very large building program.

Dr. W. J. Knox, of Kelowna, B.C., is at present in Vancouver attending the Liberal Convention of the Province, in which he is a prominent figure.

J. H. MACDERMOT

Manitoba

A most interesting meeting of the Winnipeg Medical Society was held on February 12 with Dr. C. M. Strong, President, in the chair. Mr. Donovan Swailes, Secretary of the Trades and Labour Congress, presented the views of organized labour regarding the organization and administration of health insurance, and Mr. B. E. Lewis, Secretary of the Manitoba Federation of Agriculture, spoke also. It is important that a subject so vital as health insurance should be carefully studied from different angles, and that the viewpoints of interested groups should be made known.

A refresher course for medical men in the armed forces put on at the Medical College, Winnipeg, on February 29, March 1, 2, was well attended. Visiting speakers included W./C. R. S. Farquharson, R.C.A.F., Col. L. S. Montgomery, R.C.A.M.C., Lt.-Col. R. I. Harris, R.C.A.M.C., Col. J. A. MacFarlane, R.C.A.M.C., Lt.-Col. J. H. Gordon, U.S. Army Medical Corps, and Dr. Wilder Penfield, Director of the Montreal Neurological Institute.

A special committee of the Manitoba legislature on March 16 considered alleged discrimination against Jewish students and those of some of the other races in admission to the medical school. The charges were made on behalf of an organization of Jewish graduates and undergraduates of the University of Manitoba. Denials of the charge were given by Mr. Justice Dysart, chairman of the University Board of

Governors; Dr. Sidney Smith, President of the University, and Dr. A. T. Mathers, dean of the medical faculty.

Dr. Mathers stated that the accommodation, equipment and instructing personnel of Manitoba Medical College could take care of only a fixed number of new students each year; that only about sixty could be admitted each year, and that last year there were 172 applications; that the application forms in Manitoba Medical College are almost identical with those used in every other medical college on the continent; and that the committee on selections has also to be governed by hospital accommodation in the Province which permit fifth year medical students to work as interns in their final year, and also make their facilities available for second, third, and fourth years. He also said that three factors are the basis of selection with the committee, none of them having any connection with racial origin. These factors are the number who may be admitted, the standing of the applicant as prescribed by the university board of governors, and the consensus among members of the committee. Scholarship is not accepted as the sole criterion of eligibility of a student to the medical profession. The Board of Governors has promised to consider the question of quotas and to report to the committee of the legislature.

Dr. P. E. Moore, superintendent of medical services for the Indian Affairs branch, Department of Mines and Resources, addressed the Kiwanis Club luncheon on March 14. His subject was Health Administration among the aboriginal Canadians. In company with Dr. F. F. Tisdall, Dr. Cruse and Mr. R. H. G. G. Bonnycastle, of the Hudson's Bay Company, Dr. Moore left that evening to continue the investigation of nutrition of Indians in Northern Manitoba.

There is a possibility that the Children's Hospital on Aberdeen Ave., Winnipeg, may be sold to the city as a nursing home and that a new children's hospital be built at the proposed health centre near the Winnipeg General Hospital.

M. J. Ranosky, M.D. (Manitoba, 1942), has been appointed to the Royal Canadian Army Medical Corps with the rank of lieutenant.

The city of St. Boniface has decided to give free treatment for tuberculosis.

A grant of \$12,000 has been made to the Provincial government by the International Health division of the Rockefeller Foundation to assist in establishment of a full-time health unit at Dauphin. The unit is expected to go into operation on May 1, 1944. Expenditure of the grant will be over a three-year period and the territory served by it will include the town of Dauphin and the rural municipalities of Dauphin, Ethelbert and Ochre River. The grant will be used as a demonstration unit to give field training to sanitary officers, nurses and specialized clerical help.

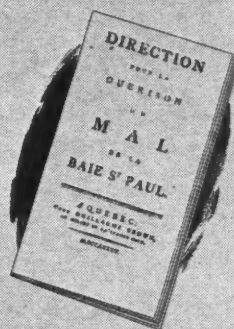
The legislature has passed an act setting up a Tuberculosis Commission for the province. This will act as a policy-forming and controlling body. The present Sanatorium Board will continue to administer the Manitoba Sanatorium at Ninette, and, with consent of the Tuberculosis Commission, may also administer the Central Tuberculosis Clinic in Winnipeg and the travelling clinics.

A plan to offer complete medical and surgical services to members of the Manitoba Hospital Service Association was drawn up on March 20 at the first annual meeting of the Manitoba Medical Services Association.

Two alternatives will be offered. The first plan will cover doctors' fees for all surgical and obstetrical

FATHERS OF CANADIAN MEDICINE

★ ONE OF A SERIES



This pamphlet, written by Badelard, is thought to be the first Canadian publication of a medical nature.

Louis F. Philippe Badelard

PHYSICIAN AND SURGEON
(1730-1802)

BORN in 1730, in Picardy, Badelard obtained his medical degree in France and came to Canada as surgeon to the French troops. During the Battle of the Plains of Abraham he was made prisoner by a Scot named Fraser. They became life-long friends. After the Conquest he settled in Quebec where he won recognition as a skilful surgeon.

He enrolled in the Canadian Militia in 1775 and the following year was commissioned as Surgeon to the Quebec Garrison. At the request of Governor Haldimand, he investigated an outbreak of disease at Baie St. Paul. Badelard continued this investigation until 1782. He diagnosed the disease as syphilis and prescribed various forms of mercury in treating it.

In 1785, a pamphlet giving detailed instructions for the treatment of the malady and the dosage of mercurial remedies prescribed was written by Badelard and circulated by the Government to all parishes for the instruction of the people. (See illustration above.)

In 1788, Badelard was conspicuous in supporting a legislative measure to compel anyone wishing to practise Physic, Surgery or Midwifery in Quebec to undergo examinations and obtain a qualifying Diploma.

Of a somewhat irascible temperament, Badelard seems later to have gained universal respect and affection, for at the time of his death, in 1802, he was followed to his family burial place at Ancienne Lorette "in spite of the intense cold" by a great throng of clergy and citizens of all classes. He bequeathed 12,000 livres (Foundation Badelard) to L'Hôpital Général for the purpose of "wintering, lodging and feeding two poor people". His obituary describes him as of "a nature faithful, zealous, charitable, gay and frank . . . the declared enemy of hypocrisy".

The example set by men like Badelard in helping to establish a sound foundation for the practice of medicine in Canada inspires this organization to maintain with unceasing vigilance its policy—Therapeutic Exactness and Pharmaceutical Excellence.

WILLIAM R. **WARNER** & COMPANY LTD.

Manufacturing Pharmacutists

727-733 KING STREET WEST, TORONTO
1856 - 1944

THE SYMBOL OF
PHARMACEUTICAL
EXCELLENCE



WARNER
ESTABLISHED 1856

care. The cost to the individual will be 60 cents a month, and \$1.75 a month for a family. This includes the mother and father and all children under 19 years of age.

The second plan will offer a more complete coverage. Doctors' fees for both medical and surgical services will be paid by the association. This would include house and office calls, specialists' services, and any kind of medical service offered by a qualified doctor. Rates for this alternative will be \$1.50 a month for an individual and \$3.50 for a family.

ROSS MITCHELL

New Brunswick

Dr. D. J. Tonning of the Department of Medicine of the Saint John General Hospital has been elected an Associate Member of the American College of Physicians.

Surgeon Lt.-Commander C. E. Brooks, at present on the surgical staff at Lancaster Hospital, Department of Pensions and National Health, was the special speaker at the monthly meeting of the Saint John Medical Society. His subject was "Penicillin". A case report was presented.

Dr. H. A. Farris, of Saint John, attended the recent meeting of the American College of Physicians at Chicago. He reports that the greatest interest of the meeting centred in the reports from the armed forces concerning the improvements in treatment and the reduction in mortality.

Dr. Lachan MacPherson, of the staff of the Saint John Tuberculosis Hospital, has returned from Chicago where he attended a surgical course at the Cook County Hospital and subsequently visited clinics at Toronto.

Dr. H. D. Reid, Medical Superintendent of the D.P.N.H. Lancaster Hospital, attended the recent meeting of Departments Hospital Administration at the Seignory Club.

The American College of Surgeons announced that Dr. G. E. Chalmers, of Fredericton, has been granted his fellowship in General Surgery and Dr. Lachan Macpherson, of East Saint John, has received his fellowship in Thoracic Surgery.

Surgeon Lt.-Commander C. E. Brooks attended the Montreal meeting of the American College of Surgeons.

The cash prize offered by the Commissioners of the Saint John General Hospital for outstanding work by this year's intern staff was divided between Dr. Jean McDonald and Dr. Frank B. McDonald.

Lt.-Col. R. M. Pendrigh, of Saint John, has been appointed District Medical Officer of M.D. No. 7, to succeed Col. A. A. James who has left to assume command of a newly formed hospital.

Major W. O. McDonald has been promoted to the rank of Lieut.-Colonel and has been appointed officer commanding Saint James Military Hospital, which has been much increased in its establishment.

Dr. D. J. Tonning has been appointed by Dalhousie University to succeed Capt. Norman Skinner on the extra-mural staff of the University at the Saint John General Hospital, while Capt. Skinner is on active service.

A. S. KIRKLAND

Nova Scotia

Dr. M. G. Tompkins, of Dominion, who has been receiving treatment in Boston, has returned home considerably improved in health.

Dr. R. M. Benvie, Stellarton, who has been ill for the past several months, is making substantial progress and will no doubt be able to resume moderate professional activities in the near future.

Those who attended the one day sectional meeting of the American College of Surgeons in Montreal report that a most instructive series of lectures and motion pictures were presented. Surgeon Captain D. R. Webster, of Halifax, was one of those taking a prominent part.

While Canada as a whole is mourning the death of Dr. Alexander Primrose, of Toronto, in one corner of this, his native Province, there is a peculiar sense of loss. In the town of Pictou his memory will be long cherished. For generations his family there promoted the best ideals of citizenship. His name was another on the long roll of honoured graduates of Pictou Academy. Though the greater part of his life was spent elsewhere, he never forgot the old town or its people. When he retired from the active practice of surgery, his instruments were sent to its hospital.

The Legislature again this year appropriated an additional sum of \$500,000 for the erection of the new Victoria General Hospital, raising the present funds available to \$1,000,000. The difficulty in securing materials of construction has delayed the project, but its ultimate erection is assured. With additional units being added to the Children's Hospital and the City Tuberculosis Hospital, as well as the proposal to erect a large permanent military hospital, Halifax is assured of its future as a treatment and teaching centre.

The generous donation of \$750,000 to Dalhousie by Viscount Bennett presents the possibility of the affiliation of the University with the pre- or post-graduate education of nurses, since one of the professorships suggested as the object of endowment is one connected with nursing education.

In 1936, Dr. D. E. Robertson, of Toronto, whose death was recorded in the last issue of the *Journal*, was entombed with two companions, McGill and Scadding, in a gold mine at Moose River, Nova Scotia. Following almost superhuman efforts they were reached and two rescued. McGill had died of pneumonia. Recently C. A. Scadding, now the only survivor, was in Halifax for examination of his feet which were severely frostbitten at the time of the tragedy.

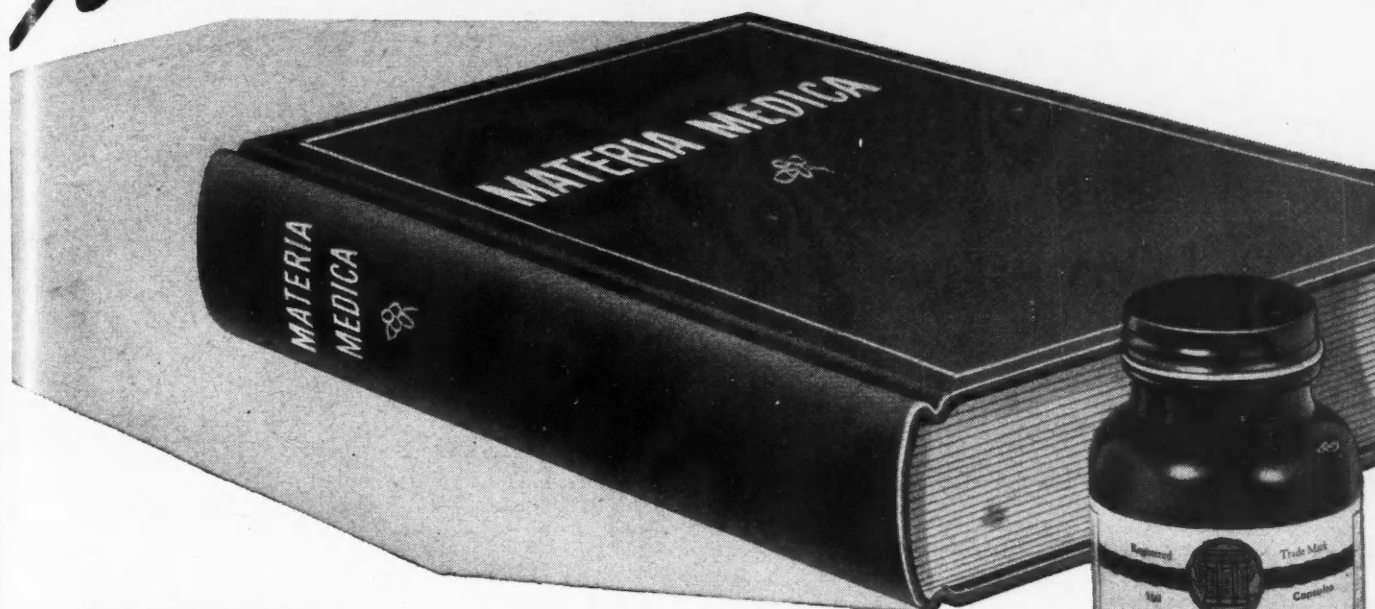
H. L. SCAMMELL

Ontario

Major W. T. Noonan who was for a time officer commanding the Montreal Military Hospital at Ste. Anne de Bellevue, Que., is now Registrar of No. 24 General Hospital, R.C.A.M.C. In civil life Major Noonan is a member of the staff of St. Michael's Hospital, Toronto, in the department of Obstetrics and Gynaecology.

A special meeting of the Council of the Ontario Medical Association was held in Toronto on March 31. The purpose of the meeting was to discuss the Health Bill which had just been passed by the Legislature of Ontario. The bill had been hastily prepared without any consultation with any of the interested parties. The council was assured that the bill had been already enacted. The actual enactment took place at a later date. Minister of Health, Hon. Dr.

For the **SECONDARY ANEMIA**



HEBULON

It is now quite generally accepted that in simple secondary anemia no hematinic other than iron is required for its correction. In many instances, however, anemia is accompanied by other signs of nutritional failure. Most frequently encountered is deficiency of the Vitamin B Complex.

In such cases Hebulon Capsules (Squibb Liver Extract, Ferrous Sulphate and Vitamin B₁) offer not only an effective dose of exsiccated ferrous sulphate, but supply, in addition, 50 U.S.P. units of Vitamin B₁ and liver extract derived from 16 Gm. fresh liver. The capsules thus provide a convenient means of supplying not only iron, but B complex factor vitamins and hemoglobin-building substances contained in liver extract, which have been shown to be frequently needed in cases of nutritional failure.

Hebulon is supplied in bottles of 100, 500 and 1,000 capsules.



FERROUS SULPHATE WITH B₁ SQUIBB

Capsules Ferrous Sulphate with B₁ Squibb are designed for oral administration in the prophylaxis and treatment of secondary anemia, especially where the addition of vitamin B₁ is considered desirable, as during pregnancy and lactation, infancy and childhood, and in patients with anorexia associated with lack of thiamine. Each capsule contains 3 grains (0.2 gram) of ferrous sulphate exsiccated (approximately 60 milligrams iron) and 1 milligram of pure crystalline thiamine hydrochloride (333 U.S.P. units of vitamin B₁).

Tablets Ferrous Sulphate Exsiccated Squibb are intended for the prophylaxis and treatment of secondary anemias where supplementary iron alone is all that is required. The tablets are enteric-coated and contain 3 grains of ferrous sulphate or approximately 60 milligrams iron.

Ferrous Sulphate with B₁ Squibb is supplied in bottles of 100 and 1,000 capsules



E·R·SQUIBB & SONS OF CANADA, Ltd.
MANUFACTURING CHEMISTS TO THE MEDICAL PROFESSION SINCE 1858

Vivian, and the Attorney-General addressed the council at luncheon and explained the necessity and purpose of the new legislation. The bill provides for the setting up of a Board of medical services which had power to make contracts with those providing the services and with municipalities desiring to secure service, whether this be general practitioner only or a complete organization including hospital and specialists or anything between. The method of paying for the services so obtained is by a personal tax on all residents of a municipality above a certain age, or by a tax on property or by a combination of the two. It now remains to see how it will work out. Legislation was passed a year ago permitting St. Joseph's Island to pay a doctor a salary and to enact a method of taxation to raise the money. The doctor is still there but the permissive legislation has not come into effect, because, it is reported, the municipality has not decided on the method of taxation. The shortage of physicians may result in difficulty for the Board should a number of municipalities ask for services and a sufficient number of doctors not be available.

The Workmen's Compensation Act has been amended to include hospital employees as well as certain other classes formerly excepted.

Plans for several new hospitals in Ontario are in various stages of advancement toward completion. Kingston General Hospital has a project that will cost a million dollars. The Sisters of St. Joseph have a permit to begin an extension of their hospital in Sarnia that will involve expenditure of half a million. New wings are proposed for the Memorial Hospital in St. Thomas. Gananoque has received a donation to provide a new operating room, and a block of ten acres has been donated by the Chisholm estate for a new hospital in Oakville. The government has offered a large subsidy to assist in enlarging the Tuberculosis Sanitarium in Ottawa.

The Department of Pensions has taken over another large property near Toronto to be used as a convalescent hospital for the Air Force. It is the Guild of All Arts which comprises six large and six small buildings on an estate of 250 acres in Scarborough, which is a half hour by motor from Toronto.

Victoria Hospital in London opened a new Psycho-Medical Ward of thirteen rooms on March 11. Dr. G. H. Stevenson, Superintendent of the Ontario Hospital in London, said "Certainly no other hospital in Ontario has a psycho-medical ward anywhere approaching this".

The new wing of Toronto East General Hospital is being used by the Department of Pensions and National Health. The first transfer of 40 patients from Christie St. Hospital was made on April 1st and a total of 200 invalids from the armed forces will be accommodated in the near future.

Dr. Leigh J. Crozier, of Chapleau, Ont., has succeeded Dr. L. C. Fallis as superintendent of Victoria Hospital, London, Ont. Dr. Fallis has joined the Ontario Department of Health. M. H. V. CAMERON

Quebec

Les Journées Médicales annuelles de la Société Médicale de Montréal auront lieu les 29, 30, 31 mai et le 1er juin. Des avis ultérieurs seront donnés.

Du 5 au 10 juin, dans l'avant-midi, une série de leçons sur l'hygiène infantile et sur la médecine infantile seront données à l'hôpital Ste-Justine sous la direction du Dr Gaston Lapierre, professeur titulaire de pédiatrie à l'Université de Montréal.

La Société Canadienne d'Endocrinologie, fondée il y a quelques semaines obtient un succès remarquable. Une première série de conférences a déjà été donnée par le Dr Hans Selyé de l'Université McGill. D'autres conférences sont en voie d'élaboration. Le Dr Paul Dumas est président de cette société et le Dr Alcide Martel en est le secrétaire.

A l'hôpital Notre-Dame de Montréal, les élections récentes ont porté à la présidence du Conseil médical le Dr Albert deGuise, et à la présidence du Bureau médical, le Dr Charles Hébert.

Il n'est pas sans intérêt de noter qu'au cours des 9 premiers mois de 1943, il y a eu dans la province de Québec 72,350 naissances. A ce rythme, il est probable que le rapport général de l'année révélera qu'il y a eu environ 97,000 naissances, chiffre qui dépassera de 3,000 le grand total de 1942.

JEAN SAUCIER

The *Revue Canadienne de Biologie* for February, 1944, contains the following papers:

J. Benoit.—Titres et résumés des travaux scientifiques publiés par le laboratoire d'Histologie et d'Embryologie de la faculté de Médecine et de Pharmacie d'Alger, de 1939 à 1943.

Raymond Kehl.—Etudes de quelques problèmes d'Endocrinologie génitale chez un batracien nord-africain (discoglosse).

Alexander Lipschütz and Luis Acuna.—On the Behaviour of Febromatogenic Quantities of Alpha-Estrodol and its Isters Absorbed from Intrasplenic Tablets.

Alexander Lipschütz and Raúl Carrasco.—Hepatic Autodefense against the Tumorigenic Action of Estrogens.

Comptes rendus des séances de la Société de Biologie de Montréal.

The Class of Medicine (1894 McGill) had its 50th anniversary meeting at Montreal, on April 5, the date on which the class originally graduated. The following members were present: A. T. Bazin, W. Gordon M. Byers, A. G. Nicholls, H. S. Shaw, all of Montreal; H. M. Kinghorn, Saranac Lake, N.Y.; L. F. McKenzie, Newark, N.J.; W. Mitchell, Norham Heights, Mass.; L. Y. McIntosh, Fort William, Ont.; George S. MacCarthy and A. T. Shillington, Ottawa.

Breakfast at the Faculty Club was followed by a visit to the Osler Library where Dr. W. W. Francis gave a talk on some of Sir William's personal books. Luncheon was held at the C.O.T.C. Armoury at which the invited guests from McGill University were, Principal James; Dr. John Fraser, Dean of the Medical Faculty; Dr. A. S. Lamb, Director of the Department of Physical Education; Col. J. Morris, O.C., C.O.T.C.; and Mr. Gordon Glasco, Secretary of the McGill Graduates' Society. A short address was given by each emphasizing the many changes that have occurred in the medical school during the last 50 years. Mr. Glasco also showed some very interesting and instructive films illustrating the growth of the Graduates' Society and the building up of the Gymnasium-Armoury. Dinner was held in the evening at the University Club, when each member of the class spoke for a short time.

Saskatchewan

Medical doctors from Saskatchewan reporting for duty in the Forces since the new year have been Dr. R. E. Strohan, of Saskatoon, with the R.C.A.M.C., and Dr. H. L. Yoerger, of Turtleford with the Royal Canadian Navy.

Also since the new year there have been five new registrations in the persons of Dr. Harley D. Jenner, on the staff of the Prince Albert Sanatorium, and a



6 on Duty

"BEMINAL"
"B" COMPLEX

♦ Tablets, Concentrate or Injectable for severe deficiencies . . . Compound, Liquid or Granules for the lesser deficiencies. This range of forms and potencies enables you to treat every B deficient patient according to his individual requirements.

1. TABLETS	4. COMPOUND
2. CONCENTRATE	5. LIQUID
3. INJECTABLE	6. GRANULES



graduate of Toronto (1933); Dr. William A. Allen, also on the staff of the Prince Albert Sanatorium, Toronto (1942); Dr. Bernard LaBelle, Toronto (1937), who comes to us from an Ontario practice; Dr. Gaston Robinson, Laval (1937), associated with Dr. Goodwin, of Moose Jaw; and Dr. Thomas J. Ho, Chicago (1936), on the staff of the Saskatoon Sanatorium.

Dr. J. J. Diner has returned to the Province and is located at Spalding, Sask.; Dr. D. S. Johnstone has resumed his civilian duties in Regina after spending several years in the R.C.A.M.C.; Dr. S. W. Arthur, formerly of Redvers, is now located at Portage la Prairie, Man.; Dr. J. A. O'Brien left the Spalding district to take over a practice at Loversburg; Dr. E. N. McDonald, formerly of Saskatoon, is now practising in Edmonton; and Dr. H. Linton is located at Estevan, having formerly practised at Bengough.

Captain G. L. Crane, who was in charge of the Prince Albert Hospital, has been appointed President of the Medical Board at the Reception Centre in Regina.

Flight-Lieutenant W. D. McPhail recently assumed civilian medical practice in Saskatoon, having last been stationed as a medical officer in the R.C.A.F. at North Battleford.

Dr. F. B. Maxfield, formerly of Simpson, Sask., is now located at Canora, Sask.

Dr. J. W. Clark has left Brock, Sask., to take up residence and practice in Vancouver, B.C.

Dr. T. F. Waugh, of Leroy, is spending an extended vacation at the Sussex Hotel in Victoria, B.C.

Captain Frank S. Macdonald, of Saskatoon, has arrived overseas with the R.C.A.M.C.

Captain A. F. Nichol with the R.C.A.M.C. is now stationed at Prince Albert as medical officer with 122 C.I.B.T.C., and Captain Margaret M. Donnell, is with No. 3 C.W.A.C.(B)T.C., at Kitchener, Ont.

The medical men of Saskatchewan are reminded of the Annual Meeting which will be held in Saskatoon, September 18, 19, 20.

H. D. HART

General

Canadian Fellowship Awards, 1944, Guggenheim Memorial Foundation.—The fifth annual series of awards on the Canadian Fellowship plan of the John Simon Guggenheim Memorial Foundation is announced as follows.

Mr. Robert England, former executive secretary, Dominion Government General Advisory Committee on Demobilization and Rehabilitation, now residing at Sidney, Vancouver Island, B.C. Project.—A study of problems of demobilization and civil re-establishment of war veterans in Canada, Great Britain, France, Germany and the United States. Mr. England is the author of "Discharged", a book concerning the rehabilitation of veterans in Canada. He plans a study of the absorption into economic life and of the social readjustment of war veterans following demobilization after this war.

Dr. Sylvia L. Thrupp, Instructor of History, University of British Columbia, Vancouver. Project.—Study of the theoretical assumptions regarding social structure and the ethical teaching associated with this theory, in the writings of Albertus Magnus, St. Thomas Aquinas, and Duns Scotus. Miss Thrupp will carry on her work at Harvard University. A distinguished scholar, she is the first woman appointed to a Guggenheim Fellowship from Canada.

Dr. Harold Logan, Professor of Political Economy, University of Toronto. Project.—A study in the development of trade unionism, particularly as relating to Canada over the period 1919 to 1943, covering both collective bargaining and legislative aspects. Dr. Logan is the author of "History of Trade Union Organization in Canada" and of other studies of labour relations in Canada and the United States.

Dr. Arthur Barker, Professor and Director of English Studies, Trinity College, University of Toronto. Project.—A historical study of the criticism of John Milton in England and America from 1674 to the present, intended to show how Milton's art and ideas affected the development of critical theory and taste and how changing critical opinion and taste affected the interpretation of his work. Dr. Barker has published several studies in the field of English literature.

Dr. Johannes F. K. Holtfreter, Rockefeller Foundation Fellow at McGill University, Montreal. Project.—Investigations of the causal factors involved in the embryonic development of vertebrates. Dr. Holtfreter is one of the world's leading experimental geneticists. He is of German origin, and was sent from England to an internment camp in Canada, from which he was released upon the appeal of Canadian scholars who admire his work and have the highest esteem for him personally. For the past two years he has worked at McGill University as the guest of the University and under the auspices of the Rockefeller Foundation.

The National Committee for Mental Hygiene announces the establishment of a fund for research in psychosomatic medicine. The purpose will be to stimulate and subsidize research in the psychosomatic aspects of the diseases chiefly responsible for disability and death. The fund will be directed by Dr. Edward Weiss. Projects will be considered by the following committee: Dr. Charles M. Aldrich, Dr. Franz Alexander, Dr. Stanley Cobb, Lt.-Col. William C. Menninger, Dr. John Romano. The fund will be administered under the direction of Dr. George S. Stevenson, National Committee for Mental Hygiene.

Communications should be addressed to Dr. Edward Weiss, 269 S. 19th Street, Philadelphia 3, Pa.

W. H. Collins Professorship of Human and Comparative Pathology.—The Council of the Royal College of Surgeons of England invites applications for the W. H. Collins Professorship of Human and Comparative Pathology. The salary will be £2,000 per annum.

The principal duty of the professor will be the care and demonstration of the pathological collections. He will also be expected to promote the advancement of knowledge of the diseases of man and animals by original investigation, and by instruction in the methods of research. At this juncture the main requirement of the College is the restoration and reorganization of its Museum. For this work suitable assistance will be provided. The election is an open one, but the Council reserves the right to invite individual applications.

Particulars and terms of appointment may be obtained from the Secretary, Kennedy Cassels, Lincoln's Inn Fields, London, W.C. 2. Applications with the names of two references must reach the College not later than July 31, 1944.

The money we put into the VIth Victory Loan is double money. It helps NOW to win the war and helps LATER, when we spend it, to win the peace for ourselves and our families.

PERTUSSIS VACCINE

FOR THE PREVENTION OF WHOOPING COUGH

WHOOPING COUGH is one of the most common communicable diseases and it may be followed by death, particularly in the case of children under two years of age. Among older pre-school children serious complications may follow an attack of the disease. It is desirable, therefore, to administer pertussis vaccine to infants and young children as a *routine procedure*, preferably in the first six months of life or as soon thereafter as possible.

PERTUSSIS VACCINE is prepared by the Connaught Laboratories from recently isolated strains (in Phase I) of H. pertussis. The vaccine contains approximately 15,000 million killed bacilli per cc.

Research studies relating to the bacteriology and immunology of *H. pertussis* have been conducted for many years in the Connaught Laboratories. Further advances in the method of preparation of PERTUSSIS VACCINE have made possible reductions in the price of this product. For convenience in use and as an added economy, it is supplied in packages for the inoculation of a *group* of six children as well as in packages for the inoculation of one child. The following packages of PERTUSSIS VACCINE are distributed:

Three 2-cc. ampoules — For the inoculation of one child.

Six 6-cc. ampoules — For the inoculation of a group of six children.

Also for the convenience of physicians who wish to inoculate children against both diphtheria and whooping cough, the following packages of DIPHTHERIA TOXOID and PERTUSSIS VACCINE (COMBINED) are supplied:—

Three 2-cc. ampoules — For the inoculation of one child.

Six 6-cc. ampoules — For the inoculation of a group of six children.

CONNAUGHT LABORATORIES

University of Toronto Toronto 5, Canada

Book Reviews

The Practice of Local Anaesthesia. G. Bankoff. Revised edition. 238 pp., illust. 17s. 6d. William Heinemann, London; Macmillan, Toronto, 1943.

This is a practical manual covering the entire field of local and regional anaesthesia, and as such it must be expected to be somewhat sketchy in its descriptions of some of the more elaborate techniques when confined to this size. However it does serve to point out for the surgeon with no particular training in anaesthesia, what is possible under local anaesthesia and offers simple directions for its accomplishment.

One could wish for a more complete description of methods of anaesthetizing the upper extremity, which with the exception of brachial block is rather hurriedly dismissed with little attention paid to wrist block and the injection of the individual nerves. Injuries of the upper extremity constitute a large proportion of the cases considered for local anaesthesia and these techniques deserve the most exact description even at the expense of slighting some of the more complicated techniques for other parts of the body, rarely if ever used. The author believes in adequate preliminary medication with morphine and scopolamine for successful results with local methods, and often combines it with an intravenous injection of evipan, especially in major cases. One typographical error occurs on page 59, when he speaks of using 3 mgm. of pentothal for minor operations and 10 mgm. for major operations. Surely he must mean 3 c.c. and 10 c.c. of a 10% solution of pentothal!

If used along with reference to such a book as Labat for his matchless illustrations and diagrams, the volume should prove extremely valuable to any doctor forced by circumstances to be his own anaesthetist.

Essentials of Modern Surgery. Edited by R. M. Handfield-Jones and A. E. Porritt. 2nd ed., 1204 pp., illust. \$12.00. Livingstone, Edinburgh; Macmillan, Toronto, 1943.

The second edition of this textbook is an especially good attempt to review the whole field of surgery for the undergraduate student, leaving no branch neglected yet avoiding that mass of special and detailed knowledge which so encumbers modern textbooks of both surgery and medicine, and which is so confusing to the medical student trying to cram it all in, while his medical school prepares him for general practice by allowing him to receive lectures only from specialists.

Fifteen surgeons have contributed sections which include not only general surgery but also adequately discuss anaesthesia, physiotherapy, ear, nose and throat diseases, urology, gynaecology, neurosurgery, orthopaedic surgery and fractures.

Definitions and the principles of surgery are not neglected. Descriptions are lucid, brief and well illustrated. Subjects which often most confuse the student are well handled. For example haemorrhage is described as haemorrhage and shock as shock, in adjacent but separate sections. Traditional errors written from textbook to textbook are largely eliminated: specific duration of immobilization for different fractures is not mentioned. The more useful rule is stated that every fracture is immobilized until it is healed.

There are certain omissions which may call for criticism, but on the whole they are inconsequential. The student who turns to this text seeking what he must learn will not be disappointed.

Pasteurization. H. Hill. 152 pp. 10s. H. K. Lewis, London, Eng., 1943.

In this volume the author aims to show the need for pasteurization of milk, the methods necessary to make milk safe, and the control measures required to achieve this. He has succeeded admirably, presenting the subject in a logical and convincing manner.

To stress the need for pasteurization, referring to supplies of raw and certified milk from all parts of England, it is said: "It was found impossible to accumulate any material quantity of raw milk on any one day in any important milk-producing area which was free from tubercle-bacilli. In every examination made, these organisms were present before pasteurization, but were absent after the milk had been so treated." Subsequently, the author answers criticisms of pasteurization and describes, in detail, pasteurization apparatus and requirements for the buildings in which the process is carried out. In discussing in-bottle pasteurization, he states that, from the public health point of view, "... the one great advantage ... which outweighs all others, is the freedom of milk after treatment from any possibility of recontamination either from apparatus, the atmosphere, or by human agency". The remainder of the book is concerned largely with processing methods, and the washing and sterilizing of bottles, cans and apparatus. The final chapter stresses the importance of control measures, with particular reference to the phosphatase test concerning which the author suggests: "... a serious failure to comply with the test on three successive occasions should be regarded as giving grounds for the withdrawal of a licence to produce or sell milk of this grade (pasteurized)".

This little book can very properly find a place in any public health library. It will be most useful for milk inspectors, as it gives the details of practically all the processes taking place in a modern plant anywhere, an intimate knowledge of which is essential in making an inspection of a milk plant.

A Handbook for the Identification of Insects of Medical Importance. J. Smart. 295 pp., illust. 15s. British Museum, London, 1943.

This book, by Dr. John Smart, is a new departure. It is definitely limited in its scope to the accurate determinations of arthropods of medical importance, outside of the Americas. There has been a real need for such a volume and the shift of the war into the old world tropics, has emphasized it. American texts deal primarily with the New World: English texts are more or less out of date. The present volume provides a good, accurate, and adequate means for diagnosing all the known arthropod vectors of disease; moreover, it is designed to be used by the medical officer or health official. The illustrations are good and plentiful—there are 178 text figures and 13 plates, some of them in colour. There are numerous keys and tables, which include the identification of larval stages of mosquitoes as well as adults. The information is accurate, succinct, and up to date. A little is said about the biology of the arthropods but no attempt is made to enter the fields of epidemiology and preventive medicine. The purpose of this book is to enable the medical officer in the field in Asia, Oceania, Africa, and Europe to identify the insects which concern him, and this Dr. Smart has done extremely well. The volume is well printed and bound and should well withstand the rigors of active service.

A Manual of Medical Parasitology. C. G. Huff. 88 pp., illust. \$1.50. University of Chicago Press, Chicago, 1943.

This small text falls far short of its name. It is, in fact, the printed version of a mimeographed manual in use for some years in the University of Chicago and it is intended primarily to accompany a practical course. It covers the entire field in some 88 pages, and, consequently, the information it conveys is of necessity sketchy. It has a small list of reference books and an index of eight pages. It is well and attractively printed, but its value, except to students taking a similar course to that offered by Chicago, will be slight.